TECHNOLOGY DEPT.

Gas Journal

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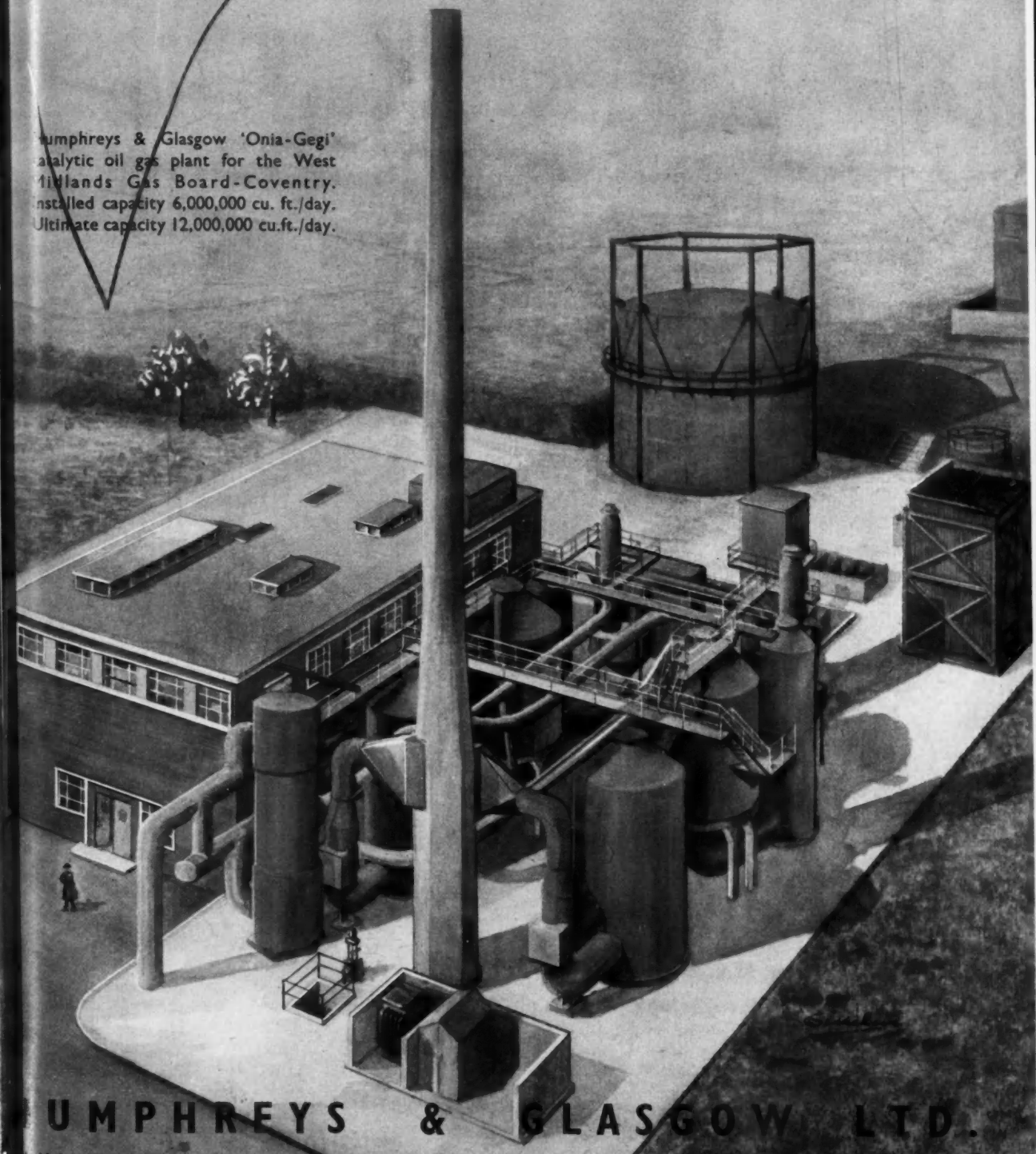
VOL. 286. 108th YEAR. LONDON, APRIL 11, 1956. No. 4839. PRICE 1/6


umphreys & Glasgow 'Onia-Gegi'
alytic oil gas plant for the West
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nstalled capacity 6,000,000 cu. ft./day.
Ultimate capacity 12,000,000 cu.ft./day.

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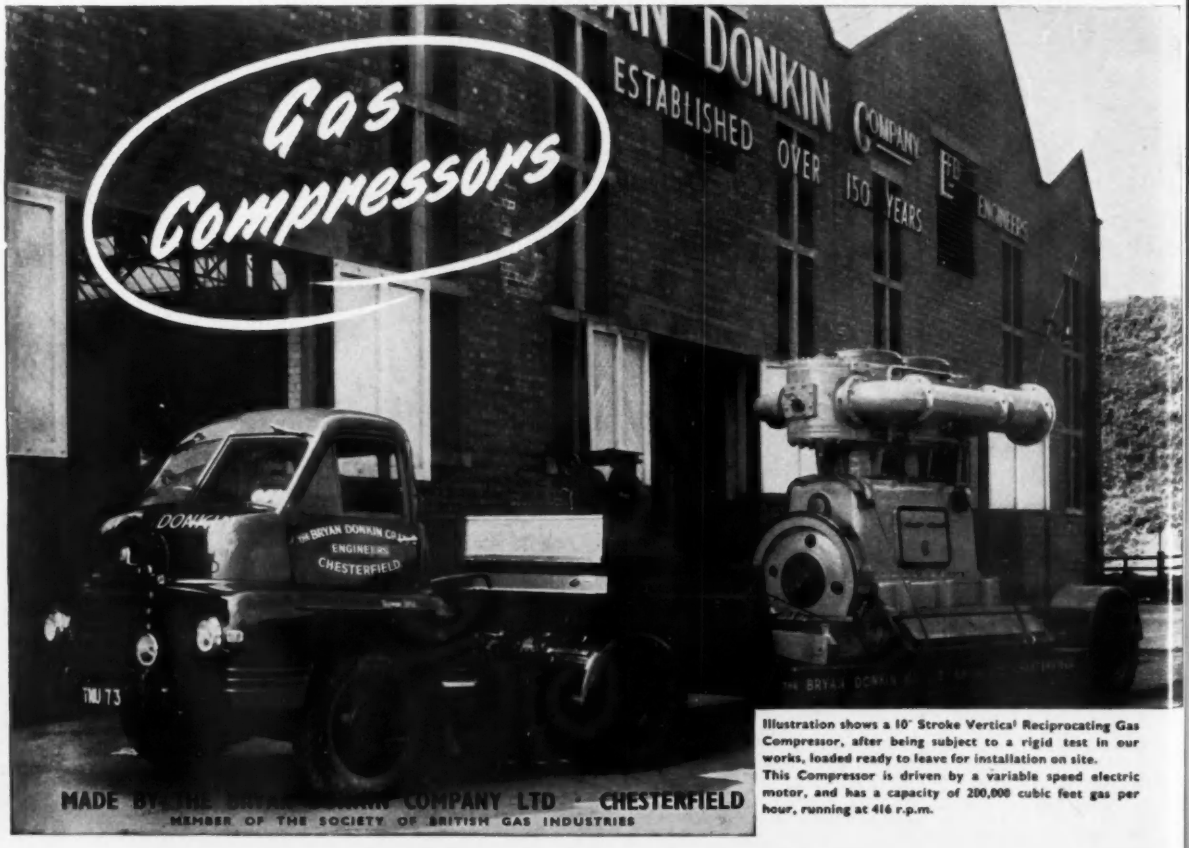

Illustration shows a 10" Stroke Vertical Reciprocating Gas Compressor, after being subject to a rigid test in our works, loaded ready to leave for installation on site. This Compressor is driven by a variable speed electric motor, and has a capacity of 200,000 cubic feet gas per hour, running at 416 r.p.m.

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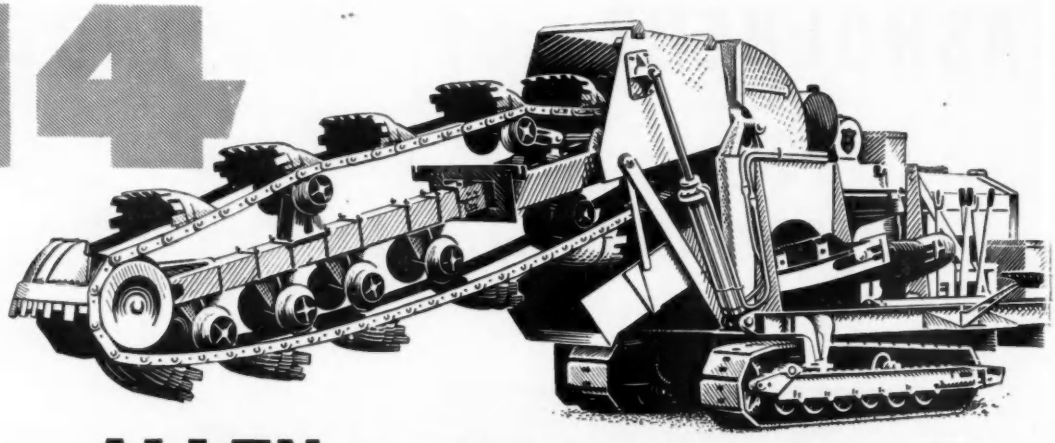

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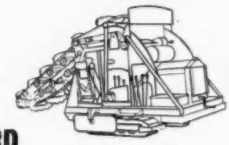

16-60 *Trencher*

12-21 *Trencher*

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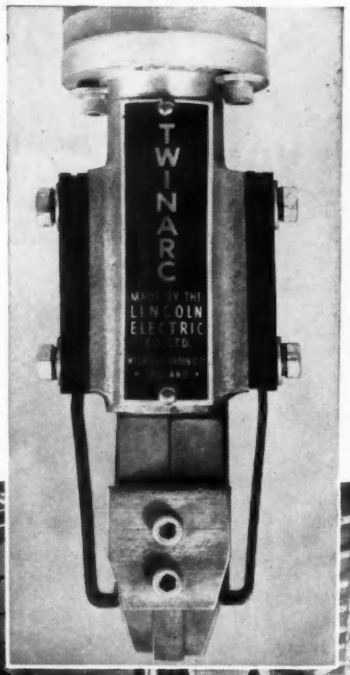
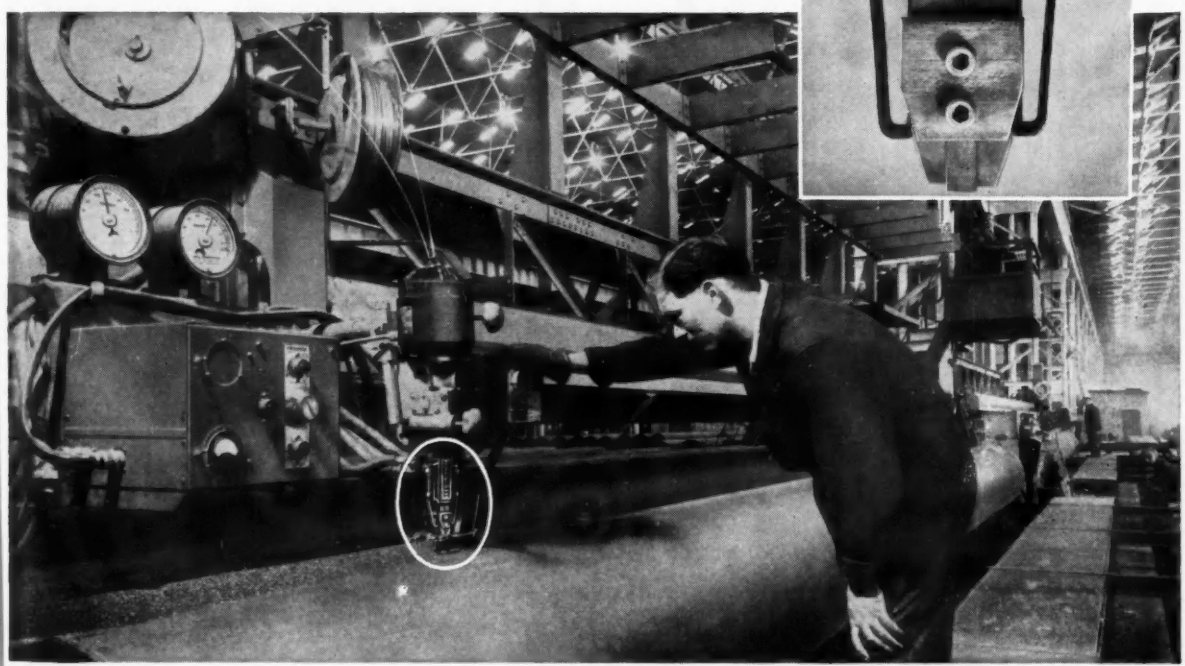
New Stockton Pipeworks uses Lincolnweld EXCLUSIVELY!

Throughout the new Stockton Pipeworks of Messrs. South Durham Steel and Iron Co. Ltd., the Welding equipment has been entirely supplied by Lincoln.





Opened by the President of the Board of Trade, this plant 'is the only one of its kind in the United Kingdom and Western Europe capable of manufacturing steel pipes to the length and diameter required to meet increasing world demand' (Middlesbrough Evening Gazette).

It has been equipped with three Lincolnweld twin-arc Fully Automatic Machines fitted with twin feeds for the electrodes, for automatic submerged-arc external welding, and with four Manual Lincolnweld M.L.2 automatic machines for internal welding by the Automatic Submerged-arc process. X-ray inspections are carried out at each stage of the pipe manufacture.

One of the first contracts secured—the £4,300,000 order for 75,000 tons of special pipe for transmitting natural gas over 250 miles of Canada—will be, in common with the whole of the South Durham Steel and Iron Company's pipe output from these works, exclusively Lincolnwelded.

LINCOLNWELD

Fully Automatic Submerged-Arc welding Equipment

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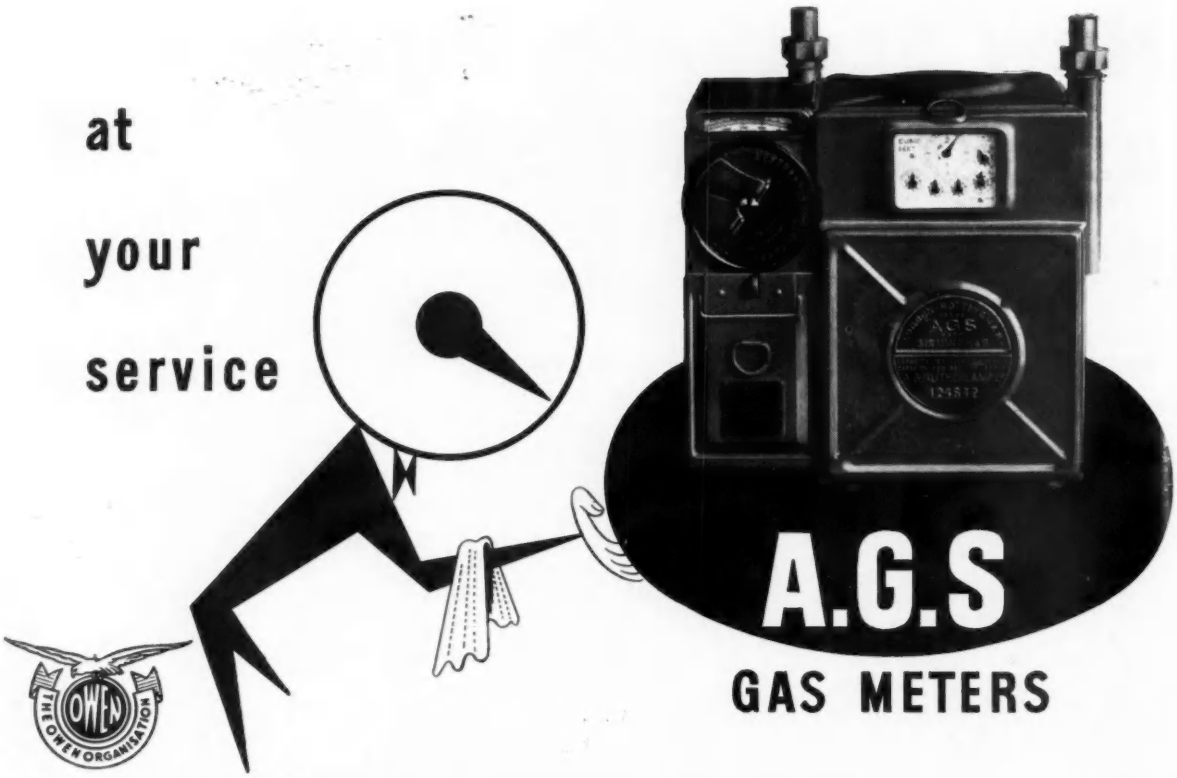

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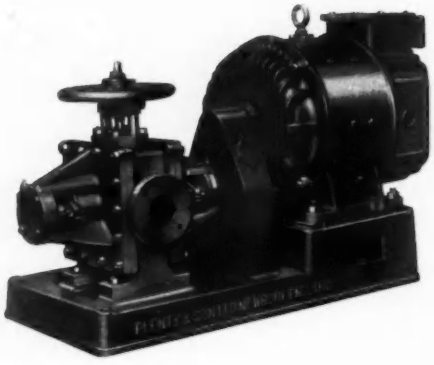

Illustration of a 3,000 gallons per hour pump unit, driven by a gas-works type motor

- SUITABLE FOR VISCOSITIES UP TO 20,000 SECS. REDWOOD NO. 1
- SIZES UP TO 750 TONS PER HOUR.
- PRESSURES UP TO 350 LBS. PER SQ. INCH
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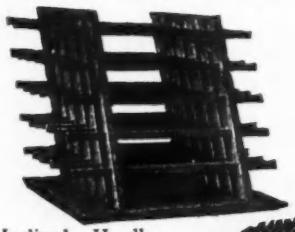
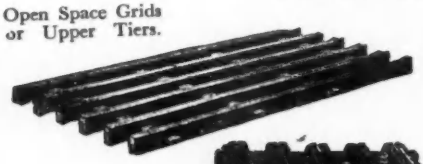
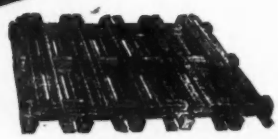


Inclined Hurdles (Light or Heavy Type) with Bottom Flat Grids.

Scrubber Grids.

Open Space Grids or Upper Tiers.





Patent Double-Barred Grids.

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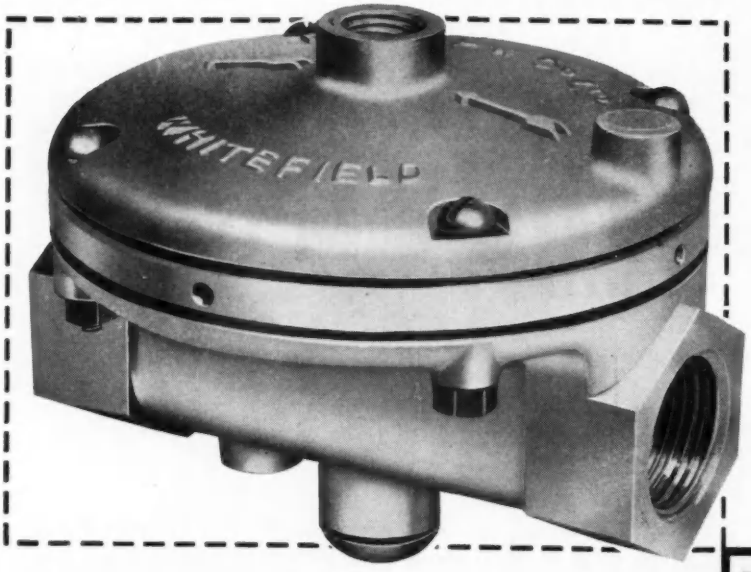

- ★ Aluminium Body (4¼" long) with Aluminium Cover (4" diam.)
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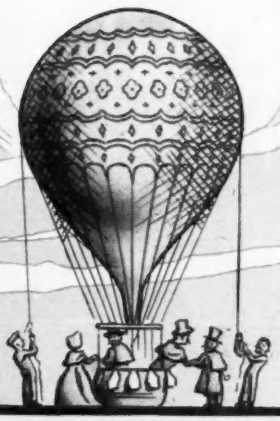

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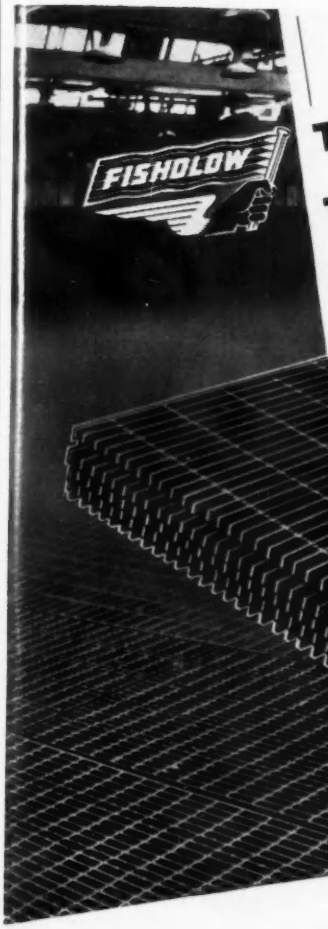

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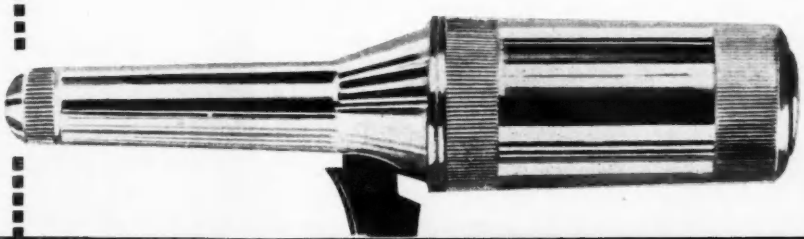

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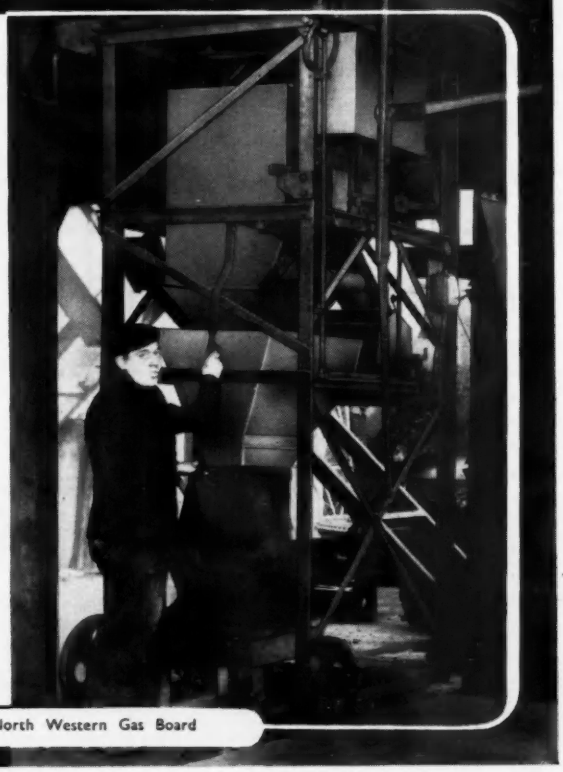

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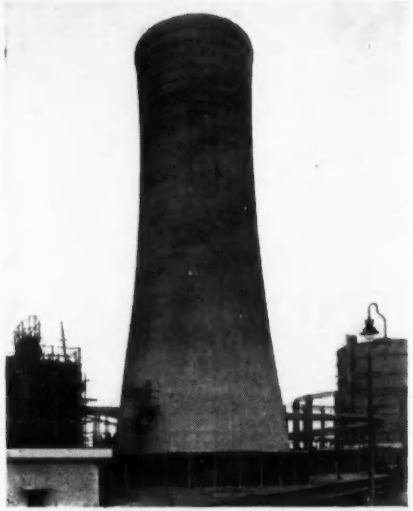
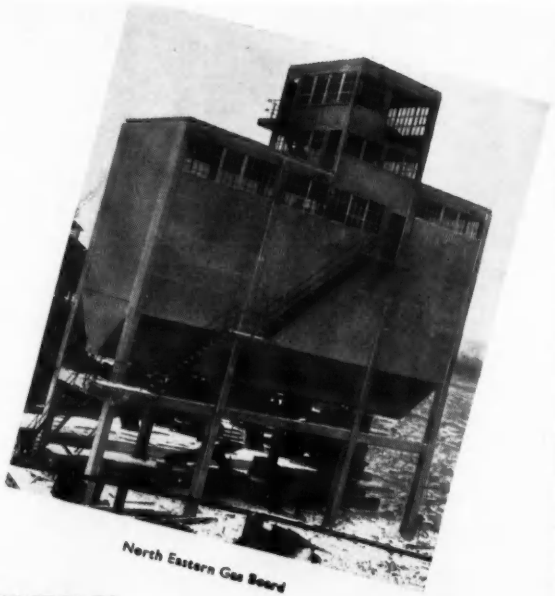
North Western Gas Board



North Thames Gas Board



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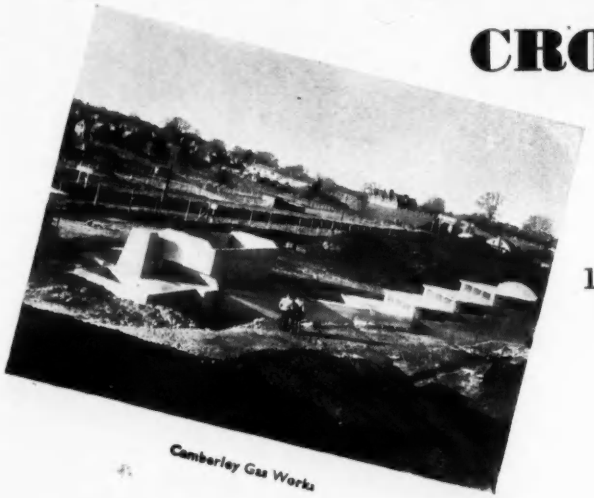

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South Eastern Gas Board

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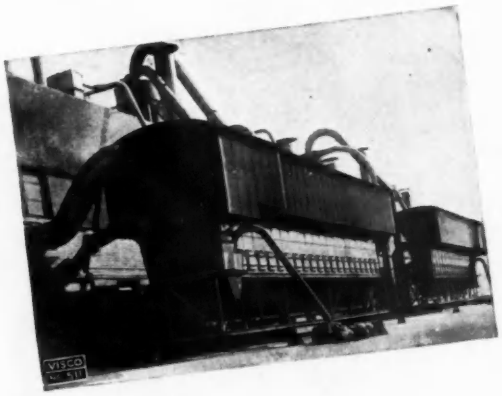
"Visco-Beth" Collectors have a recovery efficiency of 99 per cent. and will operate for long periods at full load with occasional unskilled attention. Write for "Modern Dust Collection and Fume Removal" list No. 532.



Two large and two small "Visco-Beth" Automatic Dust Collectors installed on the roof of a Sheffield factory recovering graphite carbon dusts.

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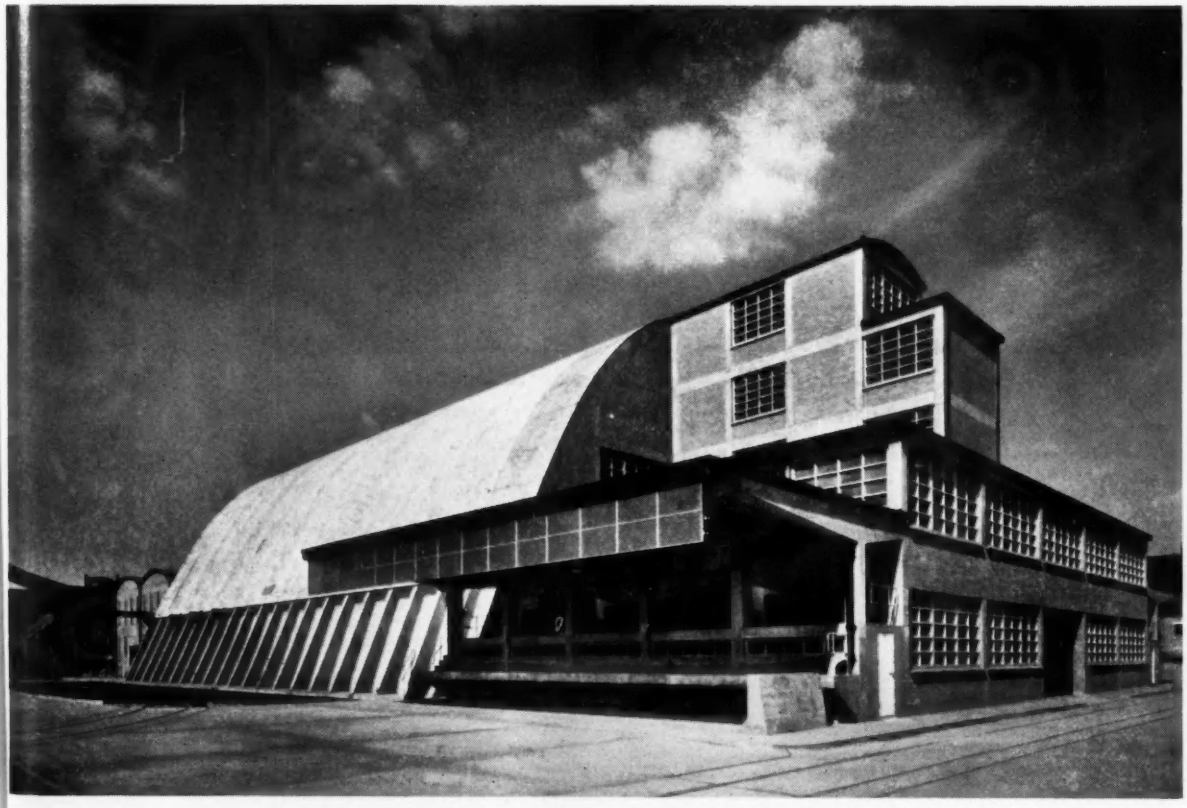

A store for 10,000 tons of Sulphate of Ammonia, recently completed for the South Eastern Gas Board at their Phœnix Wharf Chemical Works, Greenwich.

Construction is of Precast 3 Hinged Arches, the constituent Rib members being Post-tensioned, Prestressed concrete, weighing over 10 tons. The roof panelling is of Pretensioned, Prestressed concrete planks, three inches thick.

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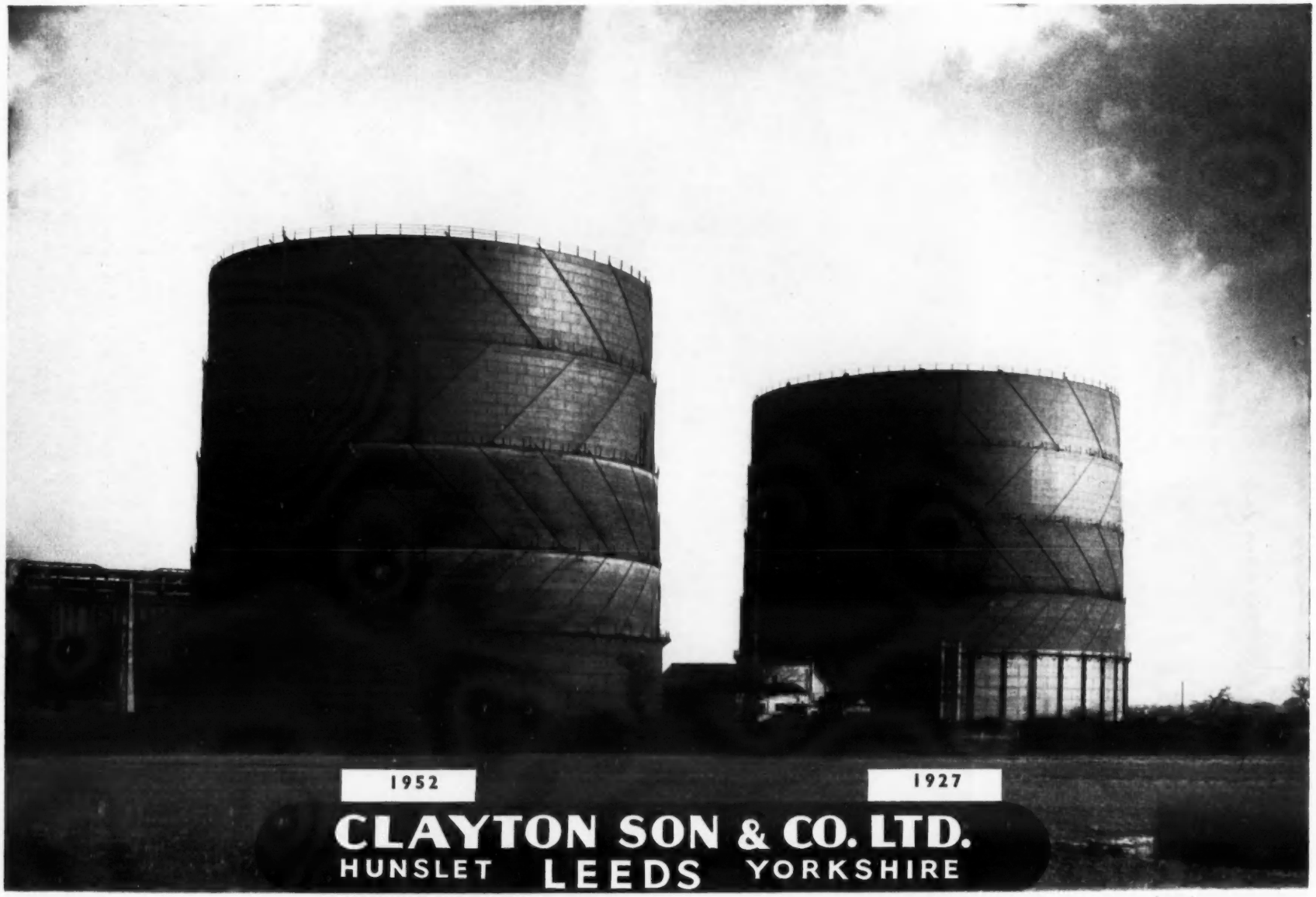
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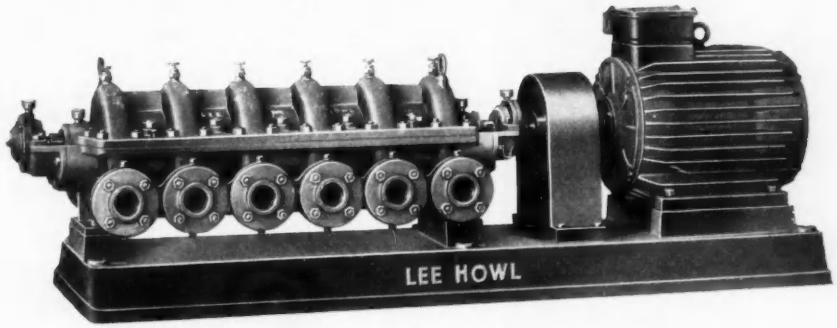

PHOTOGRAPH SHOWS A 2" SIZE SIX CELL PUMP WITH CIRCULAR FLANGES

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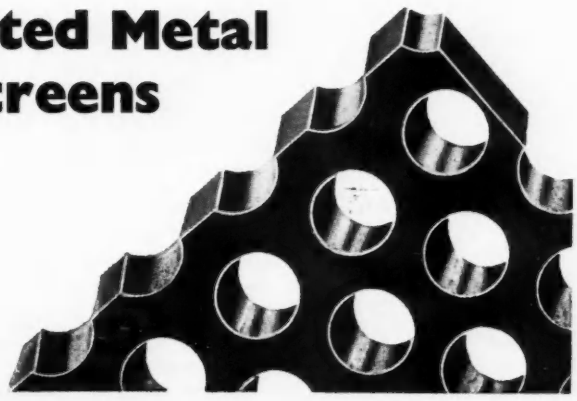

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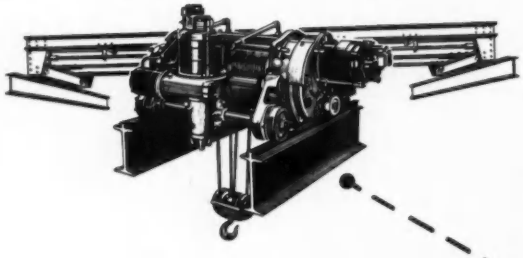

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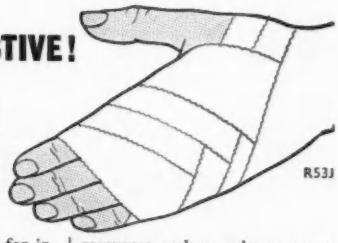

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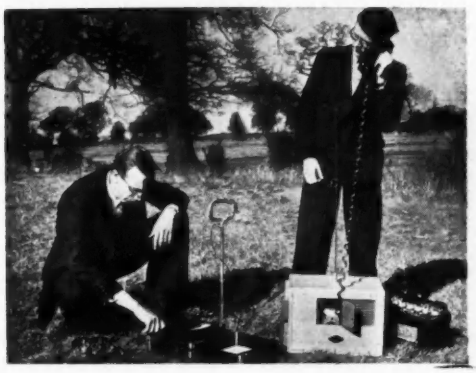

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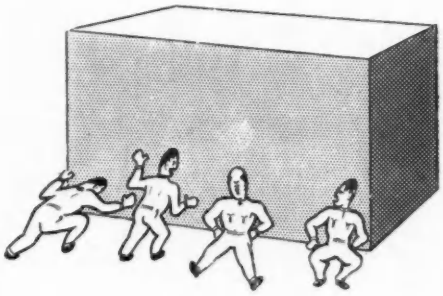

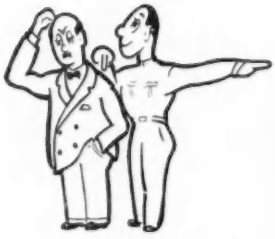

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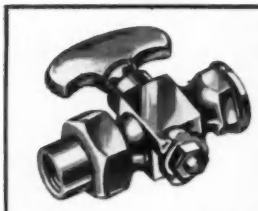

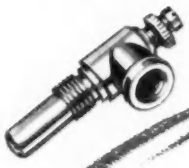

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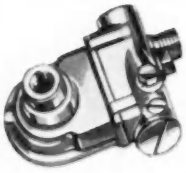

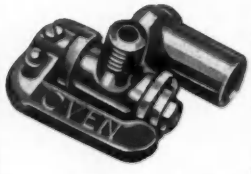

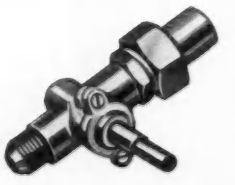

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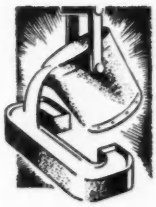

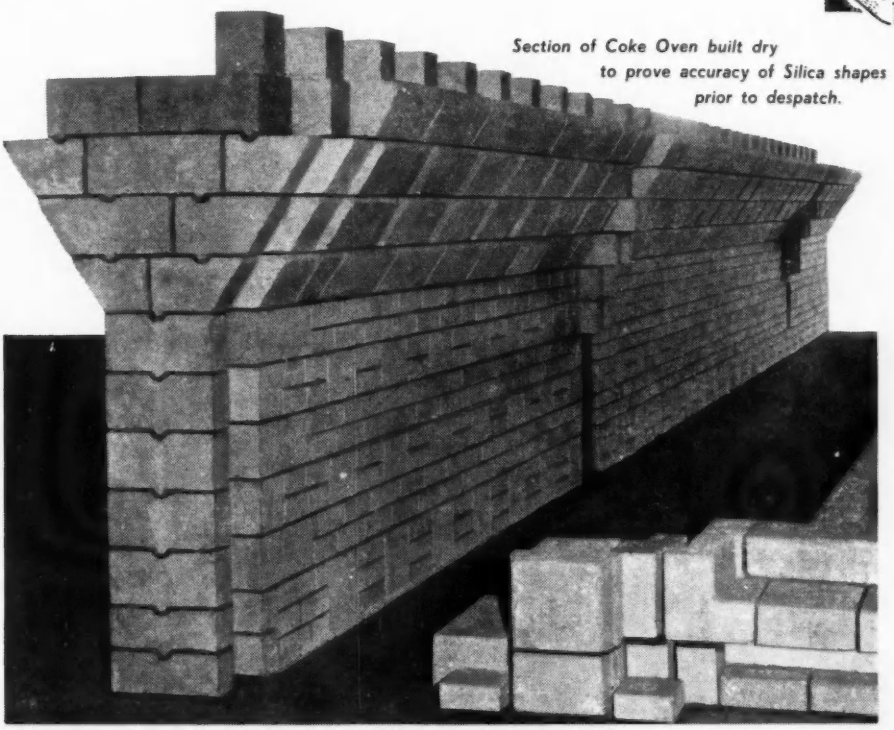

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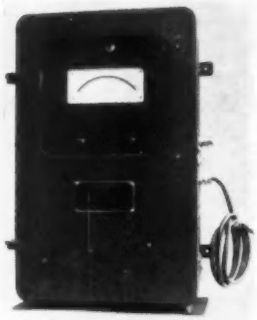

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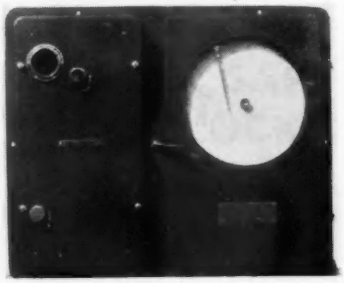

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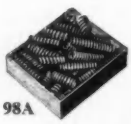

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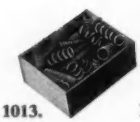

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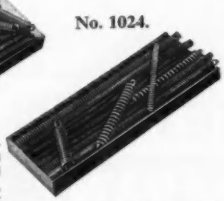

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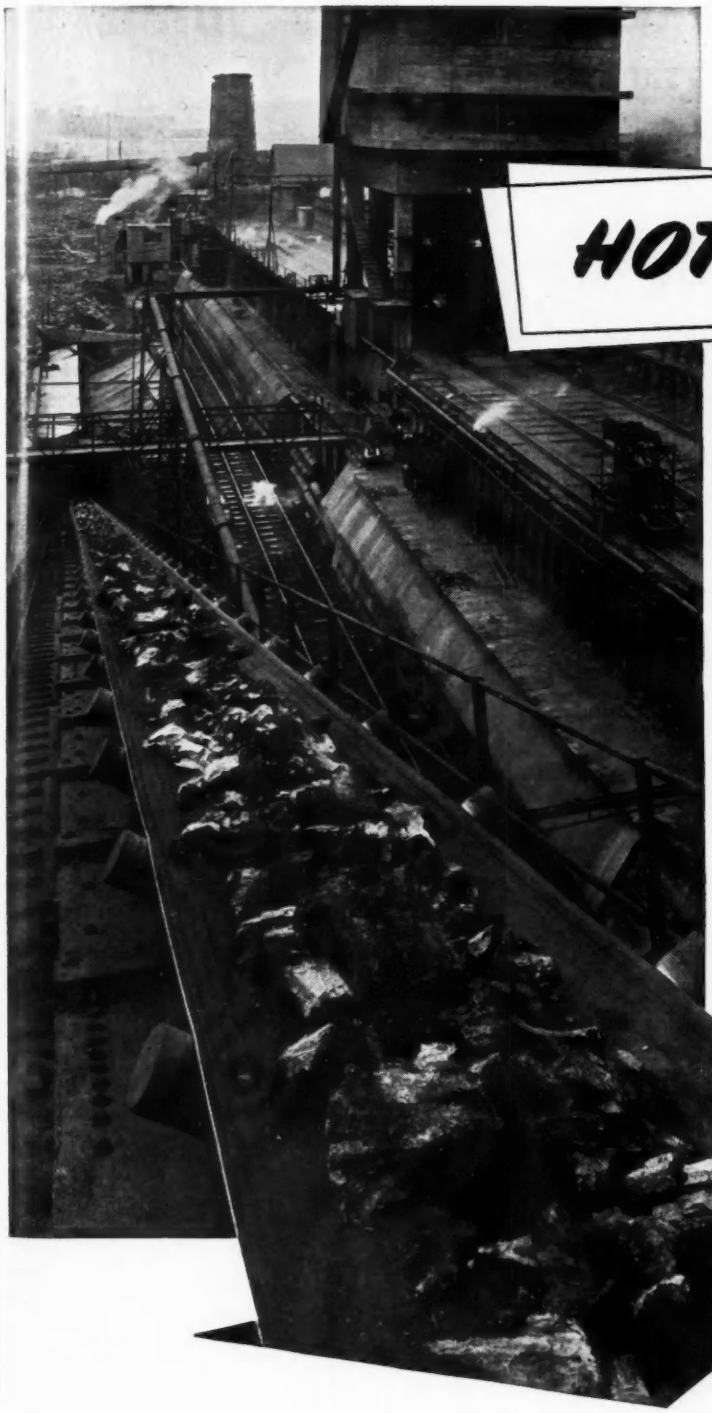

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PAXMAN BOILERS IN INDUSTRY

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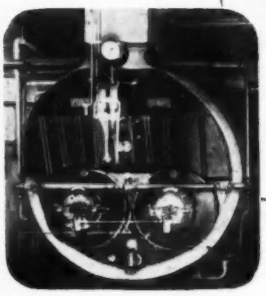
ECONOMIC DOUBLE-PASS



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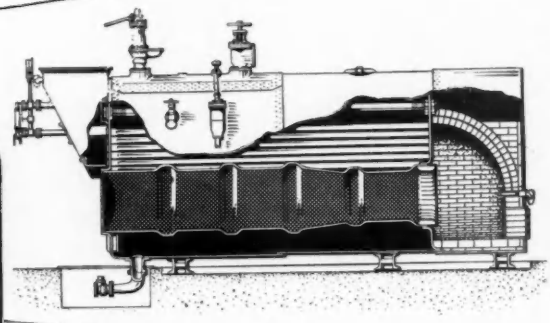
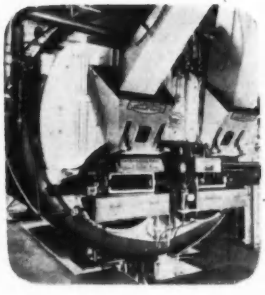


ECONOMIC TREBLE-PASS



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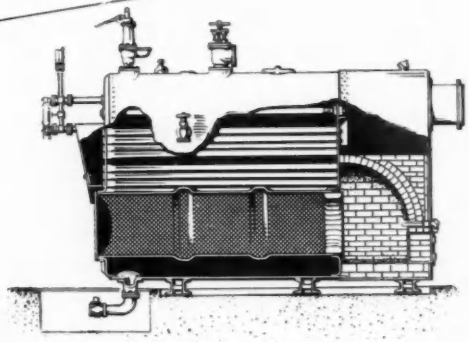

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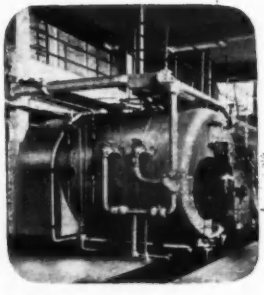

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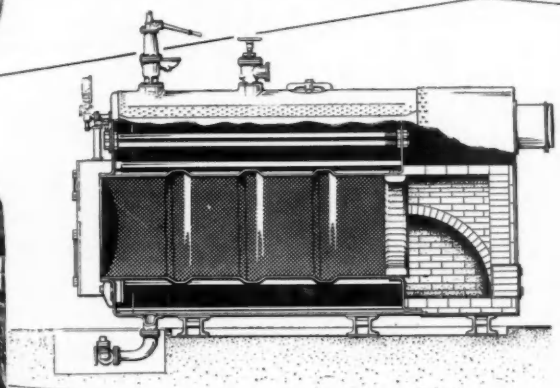

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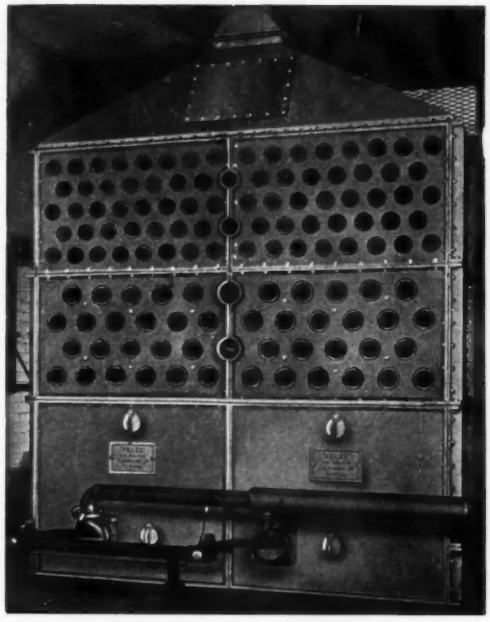

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Gas Journal

VOL. 286 *NO. 4839* *April 11, 1956*

108TH YEAR

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Gas Journal

VOLUME 286. No. 4839. APRIL 11, 1956. 108th YEAR

Is the Accountant's Tiny Hand Frozen?

'THE trouble with the industry today,' said an eminent gas engineer recently, 'is that it is struggling within the grip of the cold hand of the accountant,' and indeed it is undeniable that since nationalisation the accountant has played an increasingly important part in our affairs. But is the accountant's tiny (though muscular) hand as frozen as many suppose? For some the accountant appears as a spectral figure bereft of the softer human emotions, with ice in his veins, and the personality of an income tax inspector crossed with an official of the Lord's Day Observance Society. In short, an analytical killjoy.

As anyone who has met accountants must know, that interpretation of the part they play in the industry's affairs is grossly unfair. Nine times out of ten the opinion of the accountant is the voice of sanity, and his views are based on mathematical facts and probabilities. It is this rigid adherence to figures which upsets many people who prefer to deal with ideas and —let us confess it—wishful thinking. It is the unarguable presentation of facts which is at times resented, and the accountant responsible for their presentation is accused of nursing the darkest motives. At the same time there are the odd cases when accountancy, which cares nothing for dreams, ideas, and imaginative planning, has blighted ambitious schemes which, with the illogical magic of such things, might have met with success if given a free hand. The point is that, in our experience, the accountant's heart (yes, he has one) beats as warmly as yours, or even ours.

These generalizations were prompted by a paper Mr. C. D. Spaldin, Chief Accountant of the Northern Gas Board's Tees-side Division, gave to the Northern Juniors on March 24. The presentation of papers by accountants, now no rare occurrence, is itself something of a post-nationalisation phenomenon, and an encouraging one, since it fosters greater understanding of the part played by the accountant in our industrial society. We wonder whether the quite widespread distrust of accountants is to some extent based on their dependence on mechanical accounting methods, which conjure up for the layman a disquieting picture of electronic brains and a diminishing dependence on the human factor. Mr. Spaldin's paper was called 'Mechanized Accountancy in the Gas Industry,' and it described in some detail the machinery of keeping records of the income and expenditure of the Tees-side Division. There were brief descriptions of automatic and hand-operated punching machines (in connection with the latter we learnt with a sort of pleasurable horror that the author has one girl who can punch 15,000 holes an hour), verifying machines, tabulators, etc. The paper concluded with the significant information that 30 mill. Hollerith cards are used in the electricity industry, 6 mill. in the gas industry, and of the latter 1 mill. is used in the Tees-side Division. From which we conclude that our own industry may be somewhat backward in the use of these modern mechanical methods and that in our undeveloped ranks, the Tees-side Division stands out as a shining example. For this Mr. Spaldin modestly refuses to take any credit, maintaining that the spade work was done by his predecessor, Mr. A. R. Croft, General Manager of the Western Group. But we are left in little doubt concerning Mr. Spaldin's loyalty to the cause of mechanized accountancy since he reveals that he is engaged in pressing his Board to order an electronic multiplier which, he claims—and we can well believe it—'would revolutionize the present procedure.'

We turn now to the discussion which followed the presentation of the paper and the suggestion made by

Mr. J. W. Pallister, the author's Divisional General Manager, that some idea should be given of what electronic accounting machines can do. This is what Mr. Spaldin replied: 'There are two main types of machine which work on the impulses from triode valves: The simple multiplier, if supplied with two meter readings and the gas charges, will subtract to find the gas used, calculate the therms and the cost at a rate of 6,000 per hour; the computer, if supplied with the necessary basic information, will produce the completed gas bill, and similarly on wages, if supplied with the starting and finishing times, the rate per hour and the necessary deductions, will calculate the basic pay, the overtime, then deduct superannuation, income tax, etc., and produce the chit for the pay packet, having analysed the whole into the various codes. So now you know.

However, it was the President, Mr. P. Lee, who asked the question which was very much in our minds: 'Is there not a danger of *over* mechanization of accounts, and is the author satisfied that this has not taken place? Mr. Spaldin's answer was, to our mind, a model of honesty. Yes, he replied, there were dangers, and one of them was that work could be put on to the machines simply because these were available. It had already been found that one task was not suitable for the machines. Originally hire purchase transactions had been on punched cards, and they could only be read by the machines or skilled operators.

Smog

As a topic for discussion smog has several advantages. It is, at any rate during the winter months, near to everyone's heart (in their lungs, for example!) it is a matter of Government concern; and it is a nice, neat, new word for an old bogey. Therefore, when Dr. A. Parker, Director of Fuel Research, addressed the North Western Fuel Luncheon Club in Manchester on April 4 on this subject, he was certain of an interested audience. Fifty years ago, he said, Dr. Des Voeux had used the word 'smog' to denote natural fog polluted by smoke, and he went on to explain that fog is formed in what is called an inversion, i.e., when air temperature is lower at ground level than above and when condensation is trapped in a stagnant atmosphere.

Briefly discussing the possibilities of dispersing natural fog, he pointed out that Fido was a device to raise air temperatures at ground level, but it was very costly. A London fog might extend over 1,000 sq. miles and be 400 to 500 ft. thick, and the power to disperse it would absorb all the electricity generated in the London area. There were surface action agents, causing fog particles to coalesce into rain, and experiments were going on along these lines. They might be used for small areas, e.g., airfields or football grounds, but such methods would be too costly for large areas.

Air pollution is due mainly to the use (or misuse) of fuels. Inland consumption of coal has risen from 175 mill. tons for a population of 37 mill. in 1900 to 213 mill. tons for a population of 50 mill. in 1954. There is a very big increase in the use of oil—from 6 mill. tons in 1930 to 14 mill. in 1950 and 19 mill. in 1954. It will possibly reach 20 mill. tons in 1955, equivalent to 30 mill. tons of coal. We emitted in 1954 about 2 mill. tons of smoke from our chimneys; at least one half of this from domestic chimneys. We also emitted about a million tons of grit and dust, 5½ mill. tons of sulphur dioxide (about 1 mill. from domestic fires), and enormous quantities of carbon monoxide—about 10 mill. tons from domestic chimneys, 10 mill. from industrial plants and 4½ mill. from road vehicles, particularly those using petrol. Concentrations of pollution vary widely. They are greater in winter than in summer, higher in industrial than in rural areas. They are conditioned by meteorological factors, relieved by high chimneys and greater velocity of discharge of flue gases.

The Challenge

Dr. Parker described how pollution is now being measured by instruments standardized by the D.S.I.R., 2,000 instruments now being in regular operation against 200 ten years ago. About 100,000 observations are reported every year, involving much statistical analysis. Observations are made by 2,000 volunteers in London, Birmingham, Leeds, Manchester, Salford, and Sheffield, using portable instruments checked by fixed instruments installed by the local authorities. Results show wide variations, from point to point and from hour to hour. Deposits of solid matter in urban industrial areas amount to from 500 to 2,000 tons per sq. mile per annum, but in limited areas; the normal average is 200 to 400 tons. In rural areas they are as low as from 100 to 10 tons.

In the 1952 London smog intensity of pollution was 5 to 10 times that of normal conditions without fog. Pollution in the 1956 smog was about three-quarters of that of 1952. The peak of the deaths curve lags some 24 hours behind that of pollution. In 1952 deaths from respiratory diseases in the London smog week were 4,000 more than normal, in 1956 about 1,000.

Carbon monoxide pollution was not appreciably greater in the smog area. In heavy traffic it may rise to 50/60 parts per million, but in Blackwall Tunnel it may reach 500 parts per million, enough to cause serious headaches in half an hour.

This is the only country where serious attempts have been made to remove sulphur from flue gas. Processes are costly and may add 8 to 14 shillings to the cost per ton of coal. The Fulham-Simon-Carves process using gas liquor seems to be the most promising. An important point is that these processes lower the temperature of the flue gases and therefore their dispersion from chimneys. To be satisfactory 90% of the sulphur must be removed; if only 50%, matters may be worse than before.

Referring to the Clean Air Bill, Dr. Parker said there should be no difficulty in reducing industrial smoke to one-fifth of the present figure, with better plant and more careful working. Domestic smoke was more difficult. The problem would be solved mainly by the use of solid smokeless fuel, the provision of which was a challenge to the gas industry. *The public would pay 20% more for coke if it was clean and of consistent quality* (our italics).

We can certainly reduce pollution considerably. We do not yet know which pollulent or combination of pollulents is most injurious to health. Dr. Parker questioned whether it was sulphur. With regard to protection, he revealed that they were working on a solution

of ammonia in alcohol which appeared to give relief to asthmatics and bronchitics; for these people the mask is not very good because they cannot stand restriction of breathing. The Clean Air Bill prescribed smoke control areas, and on this point Dr. Parker expressed the view that technical control should be vested in the Alkali Inspectorate working in collaboration with the local sanitary inspectors.

This was a particularly useful analysis of the present position, an unpleasant position, to be sure, and the more so because it is largely the result of our own folly. But if smog does nothing else, it does at least present our industry with a challenge. It remains to be seen whether we accept the challenge or, as we sometimes suspect, merely talk about it until it is too late.

Storm in a Teacup

AFTER causing a public outcry and a violent little storm in the United States Senate recently, the Natural Gas Bill passed through its final stages, and Federal control of the price of natural gas at the well-head was swept away. Later the Bill was vetoed by the President.

Those against the Bill hotly deplored that it could result in the gas bills of 25 mill. American natural gas consumers rising by $50 a year—about £18. Those in favour argued with equal vehemence that since Federal control would still be exercised on the transporter and the distributor, and since the price of the gas the distributor purchased represented but a fraction of his total operating costs, the possible increase of between $600 and $900 mill. which, it was alleged, the producers were likely to rake in would not be passed directly to the housewife. They went further and claimed that the producers would be encouraged by their increased earnings to embark on more drilling and would subsequently be able to reduce their charges, thus actually benefiting the consumer in the long run.

It takes a student of American political life to understand how a matter of such nebulous consequence to the lives of the people and the well-being of the nation could arouse public uproar and touch off dissention in the Senate at a pitch more generally associated with Paris than with Washington. In fact, loyalties were at stake—loyalties shifting in the Senate from the national interest to the interests of the place where the warring senators were born. To add fuel to the blaze—indeed, to spark it off—was the rumour that bribery was involved.

It is doubtful whether similar scenes will be witnessed in Westminster if and when natural gas becomes a large-scale commercial proposition in this country.

ART AND INDUSTRY

Gasworks are usually shunned by artists in search of a subject, and apart from industrial photographers who earn their bread and butter there, the brotherhood of the lens find little to their liking around carbonizing plants. An exception to the rule is Mr. David Greenhill, of Perth, whose study of the Nairn River Estuary showing the gasworks has been hung in exhibitions at Birmingham and Folkestone, and at the Institute of British Photographers in London.

Personal Notes

MR. FREDERICK BELL, Distribution Engineer to the Liverpool Group of the North Western Gas Board, has been appointed Distributing Engineer to the Southern Gas Board. He is to commence his new duties in the summer. He received his early technical training at Leeds College of Technology, followed

by a Degree Course at Leeds University in gas engineering and fuel technology, where he held the Institution of Gas Engineers' Corbet Woodall Scholarship. He holds the diplomas of the Institution of Gas Engineers in both Gas Engineering and Gas Supply, is at present a Member of Council of the Manchester District of the Institution, and a Past-President of the Manchester Junior Association. After works experience at Meadow Lane, Leeds, followed by his Degree Course, Mr. Bell became an industrial gas engineer at Leeds, and it was in this capacity that he moved to Liverpool in 1934. In 1940 he became Distribution Engineer and was in charge of the Liverpool distribution system during the 'blitz.' Mr. Bell reorganized the system at Liverpool, using medium pressure gas distribution and introduced the use of supervisory remote control to the gas industry. The control room at Liverpool has been visited by gas engineers from many parts of the world. In 1947 Mr. Bell visited gas undertakings in America and from that experience brought into practice in the British gas industry, among many other things, flexibly joined split collars for the repair of broken mains, and a new technique in gas service laying. Mr. Bell is one of the early members of the Pipes Committee of the Institution of Gas Engineers, and has served on the Institution's Board of Examiners.

MR. R. B. REYNOLDS, MR. J. E. PASHLER and MR. R. E. SANDALL have been appointed Alternate Directors of George Wilson Gas Meters, Ltd., Coventry. Mr. Reynolds is the son of Mr. T. Reynolds, who was for many years the Engineer and Manager of the Stockport gas undertaking. Mr. Reynolds was employed by the Company between 1936 and 1938, after which he became a technical assistant to the Stockport Corporation Gas Department, until 1940. He was commissioned in the Royal Engineers. In 1950 he rejoined the Company and is now the Sales Manager for the North of England and for Scotland for both George Wilson Gas Meters, Ltd., and Radiant Heating, Ltd. Mr. Pashler joined the Company in 1933. He attended the Coventry Technical College and obtained engineering qualifications, which he has applied in all departments of the Company's business. During the war he was largely responsible for a number of munitions contracts and at a later date was responsible for opening works on behalf of the Company in Jarrow, Glasgow and Cardiff. Latterly, he was appointed assistant to the Managing Director and has just completed the Management Course at the Brooklands College. Mr. Sandall joined the Company almost two years ago.

Obituary

MR. C. M. PLOWMAN, M.B.E., one of the gas industry's oldest and most faithful servants, has died. He served the industry at national level from 1919 until he was forced to retire in 1954, after a very severe bout of illness. During his 35 years of service with the industry he became in turn Assistant Secretary of the National Gas Council, Secretary of the Federation of Gas Employers, Employers' Secretary of the National Joint Industrial Council and of the National Joint Council for Gas Staffs, and Secretary of the Industrial Relations Committee of the Gas Council. From 1951 to 1954 he acted as Adviser to the Industrial Relations Committee. In the Coronation Honours List, he was awarded the M.B.E. His friendly and co-operative attitude made a lasting impression on the employers whose interests it was his duty to serve, on the trades unions representatives actively associated with the industry, and on his colleagues. He will be greatly missed by a wide circle of friends both within and outside the industry.

Diary

April 9-14.—FOURTH FACTORY EQUIPMENT EXHIBITION, Earls Court.

April 12.—MIDLAND JUNIORS: President's Day, Birmingham.

April 12.—EASTERN SECTION, I.G.E.: Visit to gasworks at Norwich. Luncheon, Samson and Hercules House, Tombland, Norwich, 12.45 p.m., followed by tour of Palace works and Bishops Bridge Works. Tea, 4.30 p.m.

April 12-14.—NORTH WESTERN GAS BOARD: Sixth Annual Conference, Winter Gardens, Blackpool.

April 16.—EASTERN G.C.C.: Connaught Rooms, London, W.C.2. 2 p.m.

April 17. — LONDON AND SOUTHERN I.G.E.: 'Development of the Dover Works of the South Eastern Gas Board,' R. G. A. Clark.

April 18.—INSTITUTE OF FUEL: Annual Corporate Meeting. Institution of Civil Engineers, Great George Street, S.W.1. 5 p.m.

April 18. — LONDON AND SOUTHERN JUNIORS: Visit to Roehampton Housing Estate, L.C.C.

April 18.—SOUTH WESTERN SECTION, I.G.E.: Further consideration of 'Symposium on Coke,' introduced by Sir Henry Jones, M.B.E., Dr. J. Burns, G.M., and Dr. F. J. Eaton. Grand Hotel, Bristol.

April 19.—WALES AND MONMOUTHSHIRE JUNIORS: Annual General Meeting, Metropole Hotel, Llandrindod Wells, 2.30 p.m.

April 20.—MIDLAND SECTION, I.G.E.: Queen's Hotel, Birmingham, luncheon, 12.15 p.m.

April 20.—MANCHESTER AND DISTRICT SECTION, I.G.E.: Annual General Meeting. The Engineers' Club, Albert Square, Manchester, 2.30 p.m. Preceded by luncheon 12.30 for 1 p.m.

April 20.—NORTHERN JUNIORS: Special Speaker Meeting. Address by Mr. J. E. White, Deputy Chairman, Northern Gas Board. Newcastle.

April 23-May 4.—BRITISH INDUSTRIES FAIR: Castle Bromwich, Birmingham.

April 23-May 4.—BRITISH INDUSTRIES FAIR (ELECTRICAL SECTION): Olympia.

April 24.—MIDLAND JUNIORS: Annual General Meeting.

April 24.—INSTITUTION OF CHEMICAL ENGINEERS: 34th Annual Corporate Meeting and Annual Dinner, May Fair Hotel, London, 11 a.m.

Calendar & Directory Alterations

The following changes have been notified during the past several weeks. To keep the information in the current 1956 edition of the Gas Journal Calendar and Directory up to date readers are invited to note these alterations in the Directory Section.

Page D28.—LEICESTER AND NORTHANTS DIVISION: Delete J. B. Walsh, *Distribution E.*, deceased.

Page D41.—BRAINTREE AND BOCKING: Delete R. Lally, *E. & M.*, deceased.

Page D56.—FULHAM: Delete Dr. A. E. Haffner, *Station Engineer.*

Page D63. — NORTH WESTERN GAS BOARD: Delete A. Henshall, *Deputy Chairman*, deceased.

Page D73.—NORTHERN GAS BOARD: Professor G. H. J. Daysh, *Part-time Member.*

Page D74.—STANLEY and CONSETT (combined units): J. R. Matthew, *M.*

Page D79.—SOUTH EASTERN GAS BOARD: Dame Alix Meynell, *Chairman, Consultative Council, ex officio*, vice A. B. Constable.

Page D93. — SOUTHERN GAS BOARD: A. E. Haffner, PH.D., A.R.C.S., M.I.CHEM.E., F.INST.F., M.INST.GAS E., *Chief Engineer.*

Page D108.—STAFFORD DISTRICT: W. Brown, *Gas E. & M.*, vice J. Poulson.

Page D119.—SCOTTISH GAS BOARD: S. Smith, *Chairman*, vice Sir Andrew G. Clow, retired.

£85 Mill. Contract

SIMON-CARVES PLAY MAJOR PART

SIMON - CARVES LTD. have played a major part in securing for the British consortium ISCON (Indian Steelworks Construction Co., Ltd.) the largest single contract ever placed with a British company. It is for the new £85 mill. integrated iron and steel plant to produce 1¼ mill. ingot tons per annum at Durgapur, for which the heads of agreement have just been signed between the Indian Government and ISCON, and for which the work of Simon-Carves, Ltd., including both sterling and rupee expenditure, is expected to exceed £15 mill.

Mr. D. T. Barritt, Joint Managing Director of Simon-Carves, and Mr. Norman Hinton, Financial Director, have both spent much time in technical and financial negotiations with Indian Government officials in New Delhi. The Company have nearly half a century's experience in carrying out large contracts for Indian iron and steel producers with the aid of their own resident technical staff in India.

Simon-Carves, as a member of ISCON, will be responsible for (1) the complete coal preparation plant, including a feldspar jig washery and a coal stocking, blending and reclaiming plant on the Robins-Messiter system, (2) three coke oven batteries (each of 78 ovens) to carbonize a total of 5,200 tons of coal per day, together with coke screening and handling plant up to the blast furnaces, (3) the complete coke oven by-product plant, including a sulphuric acid plant, (4) the steam-generating plant to supply high-pressure steam to the entire steelworks, with associated electric power generation, and (5) a variety of equipment and services inter-connecting various sections of the plant.

The façade of the new George Wilson factory at Cardiff.

Welsh Branch of George Wilson

THE first branch in Wales of the firm of George Wilson Gas Meters Ltd., Coventry, was opened in Cardiff on March 27 by Mr. T. Mervyn Jones, Chairman of the Wales Gas Board.

The premises at Tredegar Street, Cardiff, will cater for the assembly and repair of standard meters drawn from South and Mid-Wales. They comprise two floors with the testing units, paint spray and despatch departments on the ground floor. The first floor is made up of the tin smith section for the actual assembly and repair, leather tying, stores and offices. A total complement of 24 employees is expected to be engaged at the factory.

Mr. W. D. Wilson, the firm's Managing Director, said that great difficulty had been experienced in finding suitable premises.

At a luncheon following the official opening, Mr. Mervyn Jones said the Wales Gas Board welcomed the opening of the new factory in Cardiff because there could not be too many and too diverse industries in South Wales. He stressed how the nationalised part of the gas industry depended upon the vitality, enterprise and initiative of the private enterprise section. 'We wish you well in your new venture and look forward to being associated with you both commercially and otherwise,' Mr. Jones added.

Replying, Mr. Wilson said the occasion was very much a red letter day in the 50 years' history of the Company and he hoped to be able to contribute to the prosperity of South Wales.

Established 1849: Dismantled 1956

BINGLEY GASWORKS CLOSES

THE gas production centralization scheme affecting Shipley, Bingley, Kildwick and Settle, which has involved the laying of a huge gas main through the Aire Valley, across the river and canal and under the railway at Bingley, has meant the closing of the Bingley gasworks, which were opened in 1849.

Gas for the Bingley area will now be supplied from Bradford in bulk, and the Bingley plant will be used only for storage and redistribution. Bulk coke will be obtainable from Bradford or Keighley and small quantities from Bingley.

At Bingley gas was first produced privately in 1844 by Mr. Jonas Sharp, at Prospect Mill. The existing works were remodelled in 1930 by the then Engineer and Manager, Mr. J. B. Balmforth. The works were to have closed down two or three months ago, but owing to the occurrence of a technical hitch in the change-over, production had to continue for a further short period.

Now some dismantling is taking place, but no definite plans for the future have been formulated yet.

S.B.G.I. GOLF CIRCLE SPRING MEETING

THE Spring Meeting of the Society of British Gas Industries Golf Circle will be held on May 28 at the Royal Mid-Surrey Golfing Club, Old Deer Park, Richmond. Members will compete during the morning for the Thornton Victory Cup and the Davis Cup.

Members of the Institution of Gas Engineers will also be competing for the Coronation Plate.

Mr. C. T. C. Woodall, the Honorary Secretary, advises those wishing to take part who have not received notices to contact him at Radiation House, 7, Stratford Place, London, W.1. Telephone Mayfair 6462.

A Fire at the gas meter manufacturing firm of Halliday Crofts and Co., Ltd., Carr Mills, Buslingthorpe Lane, Leeds, destroyed part of a two-storey building and damaged almost 300 meters ready for delivery. A filing cabinet containing the Company's records was also badly damaged. The Leeds Fire Brigade were fighting the fire almost three hours.

HEAVY FALLS IN APPLIANCE SALES DURING THREE QUARTERS OF 1955

DURING the nine months ended December, 1955, sales of cookers were nearly 30% lower than in the corresponding months of 1954 and sales of water heaters more than 40% lower. This is attributable to the hire purchase restrictions imposed in 1955.

Further statistics issued by the Gas Council on March 28 show that:

(1) The steady increase in the use of gas for industrial purposes continued, sales to industry during the nine months being 5% higher than in 1954. Commercial sales increased by about 1½%, but domestic sales were ½% lower. Total gas sales were 1½% higher.

(2) Coal gas made increased by 2.6% and water gas made fell by 17%. Coal carbonized was 2.2% higher and there was a fall of 18% in oil used.

(3) In the third quarter, October to December, 1955, of the financial year 1955-56, gas sales were unchanged as compared with the corresponding period of the previous year.

(4) In the nine months, domestic sales decreased by ½% but industrial sales increased by 5%. Commercial and other sales also increased by approximately 2%.

Gas Production

The increased sales were met mainly by increasing the production of coal gas. The production of coal gas in the nine months ended December, 1955, increased by over 2½% and the quantity of coal carbonized rose by 2.2%. Water gas production fell by 17% and the use of oil in water gas fell by 18%. In the nine months 4.8 mill. gal. of heavy oil were used in oil gasification plants and in water gas plants.

The quantity of surplus gas purchased from coke ovens and oil refineries increased by 9½%.

By-Products

The production of coke increased over 4% above the corresponding period of the previous year. Coke used in water gas production was reduced by 17% but sales of coke were over 4% up on the previous year. Crude tar production increased by 2% but crude benzole production fell by 2% in the nine months ended December, 1955.

New gas making capacity to a total of 64 mill. cu.ft. per day was completed and brought into operation during the nine months ended *September*, 1955; this was a smaller figure than in the corresponding period of the previous year.

N.W. BOARD EMPLOYEES' OPPORTUNITY TO CRITICISE

A CROSS-SECTION of the North Western Gas Board's 19,000 employees will meet Board members and management both in conference session and informally after conference hours and will discuss with them the Board's policies in open forum at the Board's annual conference this month.

This conference was first held as an 'experiment in industrial relations' two years ago.

Those attending the conference, some 650 men and women in all, will be chosen from works consultative committees on the manual workers side and the staffs joint industrial committees on the staff workers side.

Discussions will centre around two papers presented by senior members of the management on safety and joint consultation. But there will also be a 'brains trust' session when delegates can raise any matter of policy.

Visitors expected at the Conference include Sir Harold Smith and Sir Henry Jones, Chairman and Deputy Chairman respectively of the Gas Council, Mr. David Renton and Mr. Owen Francis, Parliamentary Secretary and Under-Secretary respectively of the Ministry of Fuel and Power, Mr. F. Hayday, National Officer of the National Union of General and Municipal Workers, Mr. G. W. Phillips and Mr. G. H. Newman, National Officers of the National Association of Local Government Workers, and Mr. W. E. Webb, Vice-Chairman of the British Gas Staff Association.

One of the Subjects to be discussed at the ninth annual conference of Incorporated Plant Engineers, Harrogate, May 16-18, will be the implication of the Clean Air Bill.

Edinburgh Gas Will Close Down Dalkeith

GOOD progress is being made with the plan to supply Edinburgh gas to a number of areas in Midlothian and East Lothian.

Production will continue for the present at Dalkeith gasworks until a new compressor station is established in Edinburgh, but it is expected that Newtongrange and Arniston works will be closed down before the end of the year, and the gas supplied in Dalkeith, Newtongrange, Arniston, and Gorebridge will consist of the local production at Dalkeith, supplemented by supplies from Edinburgh.

The new compressor station will be a major installation, serving also Musselburgh, Prestonpans, and other communities in East Lothian. As soon as it is completed, which will probably be within the next two years, it is the Board's intention to close down the works at Dalkeith and give a 100% supply of Edinburgh gas.

Gasholder stations will continue to be maintained at Dalkeith, Arniston, and Newtongrange to provide local storage.

1,240 Years' Service is NO Laughing Matter!

A further 31 employees of North Thames Gas Board were presented with long-service awards the other week by Mr. Michael Milne-Watson, Board Chairman, at Vincent Street, Westminster. Each of the recipients had completed 40 years with the Board, representing a total of 1,240 years service. The eight men pictured above all worked at one time in the old Rental Department of the former Gas Light and Coke Company.

AT LAST! — *Someone Defends Nationalised Advertising*

THE South Western Gas Consultative Council at Taunton recently expressed strong disagreement with a consumer—Mr. A. F. L. Stuckey, of Weston-super-Mare—who wrote complaining of public money being spent on what he called 'unnecessary advertising of a nationalised monopoly.'

There was no doubt, Mr. Stuckey wrote, that consumers generally were concerned at the 'extravagance' of such things as 'Kitchen Magic,' and what he termed 'many other wasteful projects.' He thought it was about time that this should be stopped, both locally and nationally.

Local officials had told him that they were in competition with other nationalised industries, and the oil companies, which were still under private enterprise. In other words, public money was being used by a nationalised industry to fight privately-owned concerns. 'This is, I think, scandalous,' added Mr. Stuckey.

Several members described the 'Kitchen Magic' exhibition as very good advertising, which was likely to benefit the sales of gas.

Councillor T. H. Martin (Bristol): What I think was scandalous was that private industry was using money to fight a nationalised industry, and was getting away with it in income tax. A nationalised industry has a perfect right to advertise its wares. The more they are advertised, the more they are sold and with greater production it would be possible, other things being equal, to reduce the price; that is our aim.

Alderman H. T. Bush (Cheltenham) said it was the bounden duty of the Gas Board to advertise. The public could not be given too much information on what the Board could do and on the advantages of using up-to-date appliances.

Mrs. D. M. Barron (Swindon) said an exhibition like 'Kitchen Magic' was certainly not a waste of money to people interested in the economic use of gas and the best way of cooking food.

Northern Juniors Discuss Mechanized Accountancy

'MECHANIZED Accountancy in the Gas Industry' was the subject under discussion at the March 24 meeting of the Northern Junior Gas Association, held at the Gas Showrooms, Middlesbrough, on March 24. The President, Mr. P. Lee, Middlesbrough, was in the chair, and members were welcomed to the Tees-side Division by Mr. J. W. Pallister, the Divisional General Manager.

Introducing Mr. G. D. Spaldin, Chief Accountant of the Tees-side Division, the speaker for the meeting, the President said that although it was unusual to have a paper on accountancy, he felt that as technicians striving towards senior management, a sound insight into the accountancy systems was desirable.

At the conclusion of the paper and the substantial discussion which followed, members were invited to inspect the machines at work and so obtain a practical demonstration of the processes described in the paper. Considerable interest was shown, and explanations were freely given by the machine operators.

Finally all members were entertained to tea, after which Mr. Aynsley (Newcastle) proposed a vote of thanks to Mr. Pallister and the Northern Board for their hospitality, and the Middlesbrough accountancy staff for working the machines on a Saturday afternoon so that members could see a demonstration.

Editorial comment on Mr. Spaldin's paper appears in this issue on p. 111.

BRITISH OXYGEN'S NEW SIX-ACRE WORKS

THE British Oxygen Company has supplied compressed oxygen from a works in the harbour area of Dundee for a considerable number of years. To cater for the volume of business a new works has now been built on a 6-acre site in the Milton of Craigie area of Dundee.

This works is capable of compressing 500,000 cu.ft. of oxygen per week into cylinders for distribution to customers along with other industrial gases which they require.

It was also decided to produce dissolved acetylene in Dundee, and the new works includes a plant for this purpose with the capacity of 350,000 cu.ft. per week.

In the Football Cup final of the North Thames Gas Sports Association, played on the Board's ground at Lea Bridge, Leyton, on the Saturday before Easter, the team from Bow Common works were victorious by 2 goals to 1 over Fulham.

One of the contestants—who won third prize—looks smug as he takes his apple pie from the oven.

Accountants Win Cooking Prizes

(*Nothing to do with the books*)

A SERIES of cookery classes was organized for *men* from the staff of the Cardiff undertaking and recently the series was rounded off with a competition. Five members qualified for the final and each had to cook a two course lunch.

The winner, Mr. J. Rees, an accountant, was presented with a pewter tankard by the General Manager and Engineer of the undertaking, Mr. John Powdrill, M.B.E.

In fact, four out of the five finalists were accountants—first, second, third and fourth.

Miss E. Hall, the home service adviser of the Barry undertaking, judged the competition.

REMOTE CONTROL FOR SEAHAM GASHOLDER STATION

AT a meeting of the Sunderland Gas Consumers' Committee, Mr. W. O. Kirkwood, General Manager of the Sunderland Division of the Northern Gas Board, announced that Seaham gasholder station, at present supplied from Hendon (Sunderland) works was to be converted to remote control.

This experimental control equipment, the first of its kind in the north, would include instruments at Hendon for recording the amount of gas at Seaham holder, the pressure of gas entering it, and the pressure supplied to Seaham area. The Seaham station would be operated automatically from Hendon and this would reduce operating costs by £1,000 per annum.

The Gas Board is to commence work on a new main, more than 18,900 ft. long, to complete the grid line from Chester-le-Street to Durham gasworks.

Laboratories of the American Gas Association at Cleveland, Ohio.

Safeguarding the U.S. Consumer

In the testing laboratories of the American Gas Association new gas appliances are subjected to 175 tests for safety, durability, serviceability, and performance. Appliances which meet the high standards demanded are granted the laboratories approval seal—the consumer's safeguard. It is estimated that 50,000 appliances and accessories have been tested in the laboratories since their establishment in Cleveland, Ohio, and Los Angeles, California, 30 years ago.

AS a national 'proving ground' for gas appliances, the American Gas Association laboratories, with facilities at Cleveland, Ohio, and Los Angeles, California, have become an integral part of the American gas industry. An estimated 95% of all new gas appliances and accessories available to the American consumer have been tested by the laboratories for compliance with the gas industry standards.

Appliance tests performed by the laboratories are designed to assure safe operation, durable construction, and satisfactory performance, as well as a long life of trouble-free service. Through such a testing programme, confidence in gas equipment is established. The laboratories are the administrator of the American gas industry's appliance approval programme which provides this confidence—a unique plan which undoubtedly has made a major contribution to the record-breaking growth of the gas industry.

As the American gas industry emerged from the illumination era into the household appliance field, the industry leaders recognized the wisdom of safeguarding the gas appliance user against unsafe and inferior equipment. After much thought and planning the American Gas Association Laboratories were established in 1925. This date marks the beginning of a continuous programme of self-regulation by the industry for the benefit of its customers. Establishment of the laboratories provided an agency which would take the initiative in the formulation and adoption of national standards for gas appliances. By centralizing appliance testing in the hands of an impartial agency, national standards could be applied. By display of the laboratories approval seal on an approved appliance, the appliance buyer is provided with a convenient means of identifying those gas appliances offered for sale which have been tested for safe operation, durable construction, and satisfactory performance.

The laboratories approval seal.

The first task confronting the industry was the preparation of national standards which would serve as the basis for the testing of gas equipment. An effective, yet flexible, committee structure was organized to carry out this task together with the development of a programme procedure in which the whole industry could participate. Responsibility for supervising the preparation of national standards was delegated to a group known as the Approval Requirements Committee. Selected representatives from gas utilities, from gas appliance manufacturers, and from a number of general interest consumer and government groups were appointed members of the Approval Requirements Committee and its sub-committees.

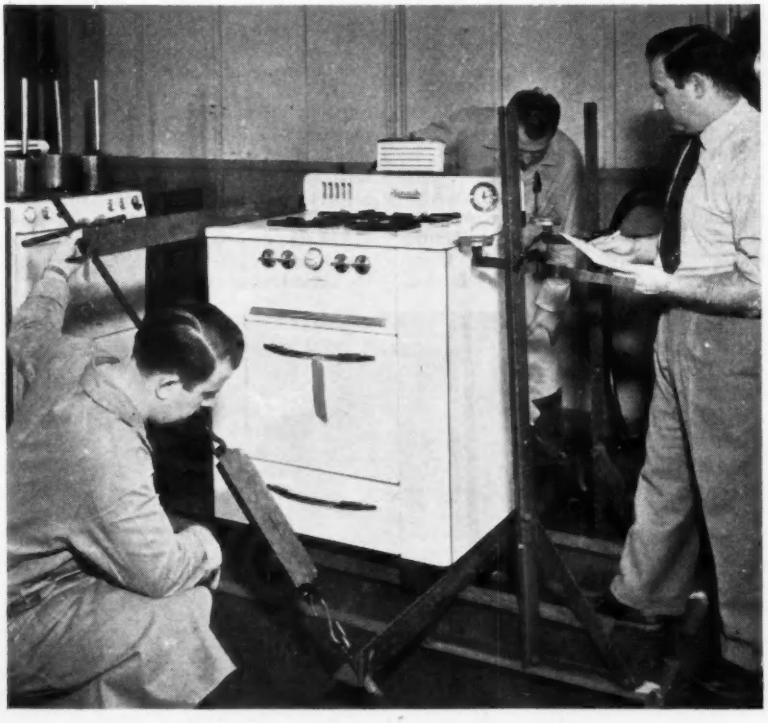
At the beginning, local requirements in use by individual gas companies were reviewed and, where suitable, adopted as national standards. Advantage was also taken of the background of practical applications and experiences of individual gas companies in the administration of local requirements. Where necessary, investigational work was performed to determine those levels of performance which contemporary appliances could be expected to meet and to devise appro-

View of the laboratories central heating gas appliance testing department.

priate methods of test suitable for universal application. Findings from these studies formed the basic information guiding the Approval Requirements Committee and its sub-committees in their deliberation and preparation of national standards. To make the standards truly national in character, provisions have been developed for testing appliances with natural, manufactured, and mixed gases, and with liquefied petroleum and LP gas-air mixtures. When the laboratories were founded, use of natural and LP gases was limited. Today, natural gas is distributed to approximately 29 mill. customers, and approximately 7½ mill. customers are served with LP gas in areas not on gas company mains. Manufactured and mixed gas customers have decreased to less than 5 mill. as additional companies convert to use of straight natural gas.

The soundness of the appliance approval programme is evident by its continued success. No significant change in the procedure has been necessary since its inception. Today, both manufacturers and utilities support the gas industry appliance approval programme to the fullest extent. It is a workable programme recognized by city authorities and governmental agencies as being in the best interest of the gas appliance user.

At the present time, the Approval Requirements Committee is supervising the development of standards for appliances and accessories, as well as standards covering the installation of gas equipment in the field, and directs the activities of 30 sub-committees. This group takes the final action on all sub-committee recommendations. Since 1930, the Approval Requirements Committee has functioned as a sectional committee of the American Standards Association. All requirements approved by it are presented to the American Standards Association, Inc., for final adoption. When such action is taken, they become American Standards and are so designated. Not only do these standards enjoy United States recognition and acceptance, but in 1927, the Canadian Gas Association appointed the laboratories as its official testing agency and formally adopted these standards. Thus the requirements are truly 'American' standards.



'Squeezing' a domestic gas range to check rigidity of construction.

In the preparation of national standards, the laboratories have been the means of bringing various interested organizations together for the common good of the gas industry and for the benefit of the customer. Through intermembership of committee representation, almost every consumer interest group in the country is represented in some form or other. In practice, suggestions and reports of field experiences bearing upon the requirements come from many sources—gas companies, appliance manufacturers, code enforcement agencies, and others, as well as through the laboratories' continuous study of appliance and accessory designs.

Models of new appliances developed by manufacturers are submitted to the laboratories to be checked over for conformance with the industry's standards. Such details are examined as completeness of combustion, satisfactory operation of burner and pilot, safe temperatures on combustible building structure, freedom from escape of gas, adequate strength and provision for ready serviceability and repair, and many other points as specified by the standards. Tests are performed to assure acceptable operation with natural, manufactured and

mixed gases as well as liquefied petroleum gases and LP gas-air mixtures. Inlet gas pressures varying from 50% below to 50% above normal test pressure are applied to provide for pressure conditions to which the appliance may be subjected in the field. In addition to tests covering safety, performance is checked to assure acceptance by the customer. For example, tests on gas ranges include oven heat distribution, top burner efficiency, acceptable broiler heat distribution, speed of oven preheat, thermostatic control operation, and others. Approximately 175 construction and performance specifications are applied to each of the various types of gas appliances.

The laboratories have also been accorded the status of a recognized electrical testing agency of electrical components and the wiring of gas equipment. The application of the electrical controls on gas equipment is carefully checked for compliance with the National Electrical Code in the United States or the Canadian Electrical Code in Canada. Tests are performed to determine that the insulation of the electrical circuits will not break down in service and that the electrical insulation is adequate to prevent leakage currents which may give rise to shock hazards.

When the model fully complies with all specifications, the laboratories provide the manufacturer with a certificate of approval as evidence of this fact. The manufacturer is then required to display the laboratories registered approval seal on each approved model manufactured.

Wide Acceptance of Seal

Appearance of the approval seal on an appliance is the manufacturer's certification to the laboratories that a unit conforms in all respects with the model tested. Display of the registered approval seal on an appliance is *prima-facie* evidence that the unit complies with the industry's standards. The approval seal is widely accepted by gas utilities, city authorities, and others.

Any approval granted remains in effect only for the balance of the calendar year. In order to obtain renewal of approval, annual factory inspections are made by the laboratories. If examination discloses full compliance with the prototype model tested, approval is renewed for the calendar year and a new certificate of approval issued. Approvals, however, may be renewed only up to a maximum of five consecutive years. At the end of this time, the appliance model must be retested under the latest standards developed by the industry in order to continue its approval. This procedure makes it necessary to keep the performance of approved gas equipment in line with advances of the industry.

Frequent unannounced inspections of the manufacturer's production are also made. These inspections may be made at the factory, at the warehouse, on the gas company's sales floor, or even in the customer's home. If discrepancies are detected, approval may be withdrawn if the discrepancies are major until satisfactory correction is made. It is to the credit of the American appliance manufacturer that withdrawal of approval is seldom necessary.

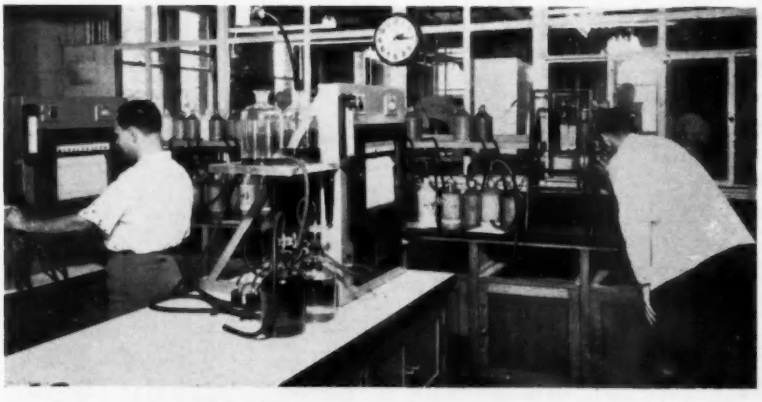
An underfired storage tank type gas water heater being tested for effect of adverse chimney conditions.

Up-to-date information on approved equipment is published in the *Directory of Approved Appliances and Listed Accessories*. It is issued semi-annually, with monthly supplements to keep the semi-annual issue up to date. The directory enjoys a wide circulation among gas utilities, appliance and accessory manufacturers, fire insurance agencies, city authorities, department stores, mail-order houses, and others interested in the purchase, sale, and installation of gas equipment.

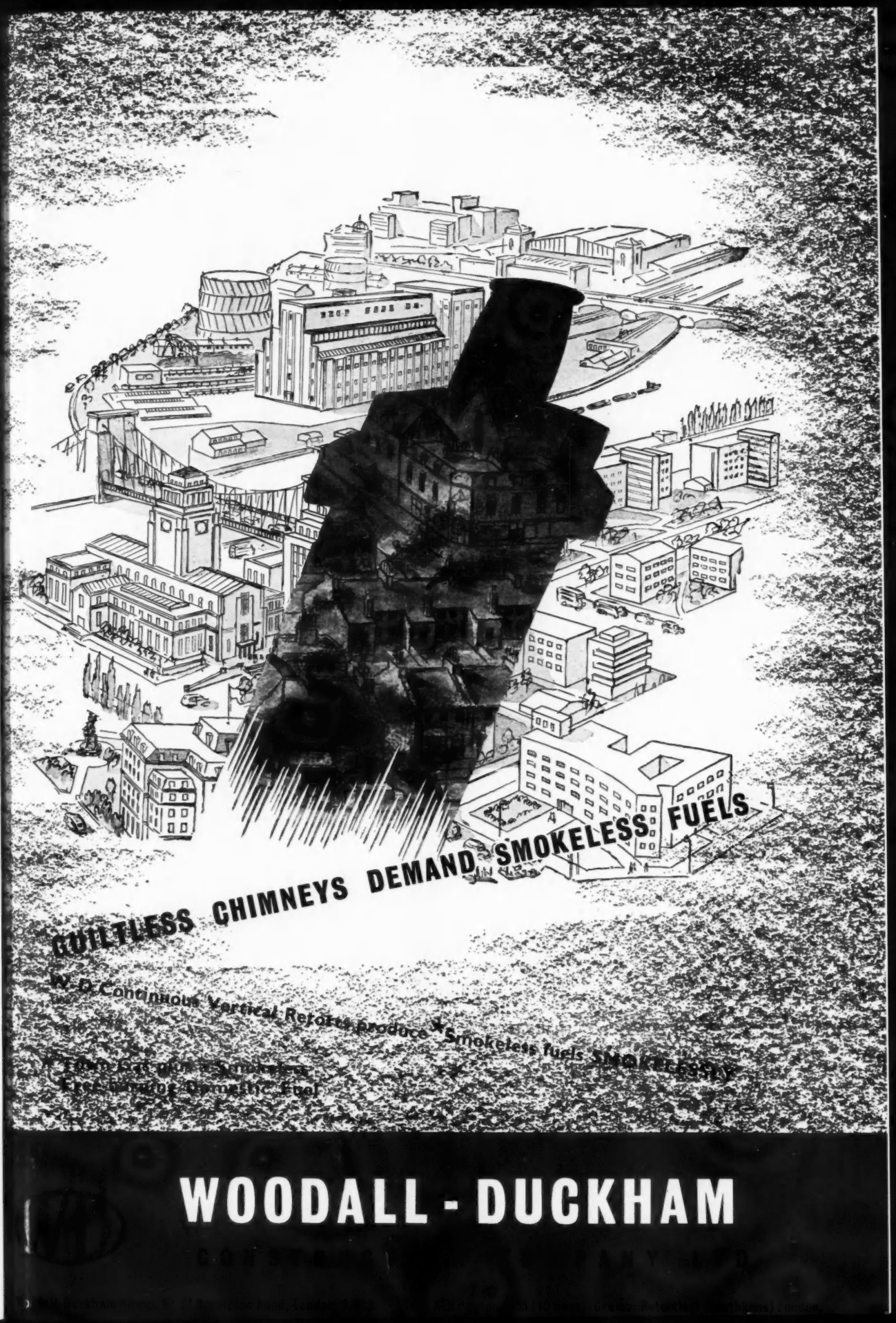
To date, it is estimated that the laboratories have tested over 50,000 models of gas appliances and accessories. The industry itself has grown to where it supplies more than 25% of the United States total energy requirements. Thirty years ago, gas accounted for less than 4% of the energy needed. During this growth, the laboratories have kept pace with the industry's needs for appliance testing and field inspection services. During 1955, 5,600 new models of appliances and accessories were examined with approximately 40% of the activity being in the central heating equipment field. During the year, over 500 annual inspections were conducted for renewal of certification, and a seven-fold increase in the number of unannounced inspections was made, supplemented by 300 inspections on the users' premises. Forty meetings were held to revise the appliance, accessory, and installation standards in the light of technological advances, many of these of more than two full days in duration.

While the major purpose of the laboratories is appliance testing, field inspection and assisting in the preparation of national standards, active investigation of the gas industry's problems through a well-planned and co-ordinated research programme is an important phase of their operations. The research studies are designed to advance the industry's knowledge of gas utilization and assist in solving many of its complex problems. At present, 18 projects are under investigation embracing the field of domestic cooking, water heating, heating and air conditioning, incineration, general gas utilization, as well as projects on industrial and commercial problems. All findings resulting from the research are published in report or bulletin form and made available to the industry. Over 120 have already been published representing a wealth of technical information.

Looking back over 30 years of operations, the laboratories can point to a long and successful record of accomplishment. Starting in loaned quarters with a staff of six, they have now expanded into two modern and fully-equipped establishments having a combined floor area of over 90,000 sq. ft., a staff of over 200, and representing an investment of approximately $1½ mill. in buildings and equipment. They stand as an example of the farsightedness of the early gas industry's leaders in bringing to their customers the best in appliance engineering and safety of operation. Today, the laboratories are an integral and vital part of the American gas industry.



The most modern of instruments, such as this ultra sensitive Lira type infra-red CO analyser, are used in the laboratories.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U·G·I GROUP

In Parliament

Those Investment Cuts ★ Gas Poisoning Accidents Implied Criticism of Gas Consultative Councils

HOW will the investment programmes of the coal, gas, and electricity industries be affected by the recent capital cuts? In the case of coal £5 mill. is to be lopped off the bill, though this will not hit at coal production; in the case of gas the figure is £4 mill., and the gas boards are still wondering what to do about it; in the case of electricity a cool £1 mill. comes off the budget, and generation will bear the major brunt. So said the Minister of Fuel and Power in reply to a question. But wasn't it foolish, his questioner wanted to know, to cut at the base of our industrial economy by slashing generation in this way. How could we do this *and* double our standard of life in 25 years?

★ ★ ★

Admitting that reductions in investment were always regrettable, the Minister suggested that as one of the alleged advantages of nationalisation was that State-owned industries were subject to direct control by the Government, there should be no complaints if this control was exercised occasionally. But, retorted his questioner, wasn't the whole point that the control should be exercised *wisely?* The Minister, however, did not rise to this. It was his aim to ensure that reductions necessitated by the country's overloaded economy were shared fairly by both nationalised industry and private enterprise, and he was clearly satisfied that he was achieving his aim.

Referring to the report concerning one of her constituents who lost his life because his landlady had ignored danger warnings from the gas board regarding faulty appliances in her premises, Mrs. L. Jeger asked the Minister whether he would introduce legislation to confer power on gas and electricity boards to cut off supplies in cases where written danger warnings had been ignored by consumers. Electricity boards already had such power, Mr. Jones said; and in view of what he felt to be the 'serious and growing problem of gas poisoning accidents,' he was considering with the Gas Council whether it could usefully be conferred on gas boards. He was treating it as a 'serious and urgent problem.' But, he added, a little cryptically, he did not know whther its consideration would lead to quite the measures his questioner had in mind. Asked whether he would assist the Scottish Gas Board to install a cut-off valve to eliminate the danger of accidents such as that which took place in Glasgow recently when three boys were saved from death only by chance, the Minister said that the Board had not asked for his help and that, anyway, he looked to the boards themselves to take seps to eliminate gas-poisoning accidents.

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On the same subject, some days later, the Minister was asked whether he would issue regulations under Section 67 of the Gas Act to make it compulsory for notices to be issued warning the public of the danger of gas poisoning arising from the incorrect use of gas slot meters. His questioner, Mr. Janner, instanced the case of a man accidentally gassed in his bedroom at whose inquest the coroner warned of precisely this danger. Mr. Janner also wanted to know whether the Minister kept records of such deaths. Except during the war years, said Mr. Jones, his Department had, indeed, kept records of such deaths. Gas boards, he added, already issued warnings of this danger, but he would consider the hon. Member's suggestion in his present examination with the Gas Council of the general problem of gas poisoning accidents.

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Something of an implied critcism came the way of the gas consultative councils in the Lords recently, albeit, under a collective hit at the corresponding bodies of all nationalised industries. In the debate on the country's economic situation Lord Beveridge—undeterred by the constant turning of deaf ears over the years—renewed his plea for a greater measure of control of all monopolistic undertakings. Each, he reaffirmed should have an organ with proper powers to receive and examine criticisms and suggestions coming from the public. Hasty inquiries by busy Members of Parliament without the means of gathering all the facts were not enough.

Radiation Install Kitchen Catering for 1,000

THE Large Apparatus Division of Radiation Group Sales Ltd., were responsible for the installation of a kitchen catering for 1,000 employees at Mullards Blackburn Works Ltd.

In the kitchen are roasting ovens on stand, a three-pan fish fryer, a Savoy griller, two Keswick vegetable and pudding steamers, four Langham boilers with stainless steel pans, three two-tier Belgravia hotcupboards, and various labour-saving machines. In the confectionery bay are a four-tier Confector pastry oven, a proving oven, and mixing machines.

A 63-ft. service counter with tea brewing sets is situated in the dining halls.

View of the main kitchen, showing two Keswick vegetable and pudding steamers, four Langham vegetable boilers, and the two-tier Belgravia hotcupboards.

GAS PRODUCTION DEVELOPMENTS

New techniques in producing Town Gas are outlined by J. H. Dyde, Deputy Chairman, Eastern Gas Board, in the Third Hodsman Memorial Lecture given at a Joint Meeting of Leeds University Chemical Engineering Society and Yorkshire Section of the Society of Chemical Industry.

THE gas industry in this country today pins its hopes on the belief that gas, provided it can be produced cheaply enough, is the ideal smokeless fuel of the future for space heating and water heating in the home, for cooking too, and for many of the heat services to industry. The countries that have been fortunate enough to discover natural gas within their boundaries give validity to this statement. This is not to decry the value and important place of smokeless solid fuel such as gas coke, but if the present upward trend in coal prices continues, the corresponding cost for the preparation and distribution of the manufactured solid fuel will be such that it will no longer be able to meet competition from the refined and mobile fuels in an age demanding higher standards of living.

The shortage of good gas-making coals and their greatly increased price has provided an incentive to find new techniques for the production of gas. Plants have accordingly been designed and are now going through extensive development stages for the production of gas from a wider range of coals and also from petroleum products, which have become more readily available by the establishment of oil refineries in this country.

Complete Gasification

A complete gasification plant designed by the Power-Gas Corporation Ltd., is at present approaching completion at the Watford works of the Eastern Gas Board. It is designed to produce 2 mill. cu.ft. a day of bituminous water gas having a calorific value of 326 B.Th.U., or alternatively about 2¼ mill. cu.ft. of carburetted gas having a calorific value of 475 B.Th.U. A diagrammatic representation of the plant is shown in Fig. 1.

The plant as a whole is made up of the retort-generator, curburettor, superheater, wash box and waste heat boiler. The retort-generator is a mild-steel shell lined with refractory brickwork, with the exception of the lower part of the actual generator, where an annular jacket boiler is situated. The small fuel employed causes a relatively high pressure loss through the fuel bed, and consequently the generator has a dry base which enables higher blast pressures to be used.

MR. J. H. DYDE,
M.Sc., M.Inst.Gas E., M.I.Chem.E.

Uniform heating is obtained by dividing the retort into segments with walls radiating from a central pier supported on a refractory arch. An annular flue is built into the walls of the retort through which the blow gases ascend. By this means some heat is transferred to the fuel and helps to maintain satisfactory conditions for the downward movement of the fuel through the retort. The fuel feed to the retort is by a cyclic charger.

The upper part of the carburettor is fitted with chequer-brick and the lower portion, into which the oil may be injected upwards, counter-current to the downward flow of gas, is chequerless. The function of the chequerbrick in the upper portion is to preheat the up-run blue watergas-distillation gas mixture, which leaves the retort at a temperature of approximately 200° C., to carburetting temperatures. To facilitate removal of carbon deposits when heavy oils are used for carburetting, the vessel has a conical base.

The superheater is filled with chequerbrick and from it the blow gases pass up a vertical main to the waste heat boiler, while the run gases pass through a three-way valve to the conical base wash-box. To enable the seal to be varied, the overflow from the wash box is adjustable, and it is taken from an internal connection near the bottom through which steam can be admitted to assist in the removal of heavy matter, if this should become necessary. From the wash-box the gas passes to a direct contact washer scrubber using re-circulated water for the removal of heavy tars, and thence to a condenser and electrostatic precipitator.

Blow Gases Provide Heat

The blow gases entering the carburettor from the retort jacket are burned with enough secondary air to provide heat for carburetting and pass through the superheater to the waste heat boiler inlet, when the combustion is completed with tertiary air, the waste gases passing through the boiler to atmosphere via the stack valve. The air valves are then closed and steam is admitted at the base of the generator for a short blow-purge. The stack valve is then closed, and the make gas valve is opened, causing the blue water gas to pass through the retort and enter the carburettor through the make gas connection. As explained previously, it is preheated to carburetting temperature and enters the chequerless chamber, where the oil is injected. It flows on, through the superheater, wash-box and cleaning plant to the relief holder. At the end of the up-run the make gas valve is closed and the hot gas valve is opened. Steam enters the bottom of the superheater, is superheated in passing through the superheater and carburettor, and enters the generator through the blow gas jacket on the back-run. Most of the steam flows downwards through the coke bed, but part can flow upwards through the retort and enters the wash-box through a direct connection from the top of the retort, by-passing the three-way valve. During the blow, a small amount of blow gas is allowed to follow the same path, to prevent distillation gases being carried away in the blow gases. On the down-run a similar arrangement prevents distillation gas diffusing downwards being cracked in the hot bed of coke. After the down-run there is a short up-run to purge the base of the generator before the blow period.

The main characteristics of the cycle will be understood by reference to small diagrams below the plant arrangement. The plant is normally intended to operate as a base load unit making uncarburetted bituminous water gas which will be used in admixture with a rich coal gas from a large battery of horizontal retorts. The carburetting equipment is supplied only to meet the needs of a high calorific value should this be required.

When the plant is operated to produce bituminous water

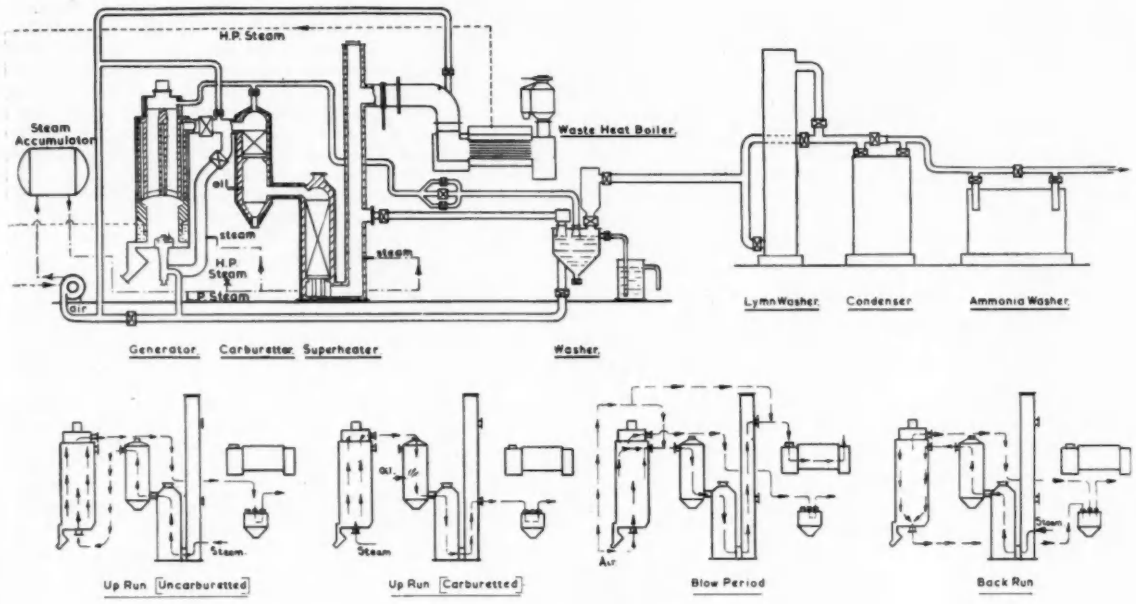

Fig. 1. Complete gasification plant, Watford.

gas without oil enrichment, the thermal efficiency of the plant is improved by introducing the up-run steam, as well as the back-run steam, at the bottom of the superheater. It is then superheated by passing through the superheater and carburettor, and passes from the top of the carburettor to the base of the generator through a firebrick lined connection.

High pressure steam for power is produced in an annular boiler of the generator and in the conventional waste heat boiler. This steam, after passing through the turbine of the blowing equipment, will pass into the accumulator and becomes available for the gas-making process.

The output of the generator is low compared with that of an equivalent coke-water-gas generator, and consequently the capital cost of the plant per unit of gas produced is higher by a factor of approximately 1.25. It is estimated that gas can be produced at a cost of approximately 90% of the cost of coke C.W.G.

It is intended that Baddesley coal (West Midlands) or a coal of similar characteristics shall be used in the plant. The proximate analysis of Baddesley coal is as follows:—

	%
Moisture	9.0
Ash (dry basis)	9.2
Volatile matter (dry basis)	36.3
Fixed carbon (dry basis)	54.5
Carbon content	71.4
B.S. Swelling Index	No. 1
Grading	⅜-1¼ in.

Using this coal it is anticipated that the following results will be obtained from the plant:—

	Bituminous B.W.G.	With Oil Enrichment
Output per day, cu. ft.	2,000,000	2,250,000
Calorific value of gas, B.Th.U. per cu. ft.	326	475
Coal consumed, lb. per 1,000 cu. ft.	41.7	40
Gas oil (enrichment value 1.3 therms per gal.) gal. per 1,000 cu. ft.	—	1.4
Heavy oil (enrichment value 1.15 therms per gal.) gal. per 1,000 cu. ft.	—	1.6
Steam produced, from and at 212° F., lb.		
Jacket boiler	20.0	17.8
Waste heat boiler	52.0	30.3
Process steam used, lb.	45.0	40.0
Thermal yield per ton of coal charged	175	—
Tar produced, gal. per ton of coal as charged	15	
Thermal efficiency, % (gross heat in Bit. B.W.G.) / (gross heat in coal)	62	

Using plant of this sort to replace a conventional coke water gas plant will free coke for the domestic market where it is becoming increasingly important as a solid smokeless fuel.

Ever since F. J. Dent discovered the exothermic hydrogenation reaction (*circa* 1938) he has been determined to harness it and put it to commercial application. He repeatedly goes back to this theme: 'As a means of generating the heat required for coal distillation, the hydrogenation reaction must approach the ideal.'

Success in the high pressure gasification research and development work now being undertaken at the Gas Council's Midlands Research Station could have a tremendous impact on the future of the gas industry, particularly when viewed in association with the collateral development of the gasification and/or hydrogenation of petroleum feed stocks.

In modern plant the carbonization process can show an efficiency of gas production of 60%, where complete gasification under pressure could raise the overall efficiency of gas production to as high as 80%. Laboratory experiments on the hydrogenation of gas oil show greatly enhanced therms per gallon compared to cracking with or without the aid of catalysts.

Catalytic Gasification of Oil

Work initiated by the South Metropolitan Gas Company and continued by the South Eastern Gas Board showed that a catalyst based on the alkali or alkaline earth metals was suitable for the gasification of heavy oil with steam to give a gas having the characteristics of town gas. This work resulted in the Segas process. Pilot plant work was followed up by the building of two commercial units, each of 1 mill. cu.ft. a day capacity, at Sydenham and York. These plants were built under licence by the Power-Gas Corporation Ltd.

As a result of the experience gained with these commercial plants, the design has been modified and future plants will have two vessels instead of three. The two-vessel unit now being erected at Ponders End, in which a daily output of 3,600,000 cu.ft. of gas of C.V. 515 B.Th.U. per cu.ft. is guaranteed, is a direct outcome of the lessons learnt on these earlier plants. The schematic arrangement of the plant is shown on Fig. 2. The reduction to two vessels has been achieved by placing the catalyst vessel over the air preheater. By the use of this design, the cost of the plant itself has been reduced, and it occupies less space.

To reduce the extent to which the oil-gas is cooled in the air preheater, fewer chequerbricks will be placed in that part of the vessel, as it was found at Sydenham that over-cooling gave rise to pitchy deposits. The gas outlet from the air preheater is now at the base of the vessel, and as this allows the length of main to the washbox to be kept to a minimum the possibility of blockages occurring is much reduced. In addition, this main will be equipped with warm water sprays

which will help to keep it clean.

The steam preheater vessel is now divided into two parts; the lower, which contains chequerbricks, fulfils the function of superheating the steam introduced at the base, and the upper, which is divided from the lower by a throat of refractory brickwork, acts as an oil vaporizing vessel. The oil is injected downwards into the empty vessel counter-current to the rising steam and the high velocity of the steam through the throat should prevent any oil droplets falling beyond that point. This is expected to give better mixing of the oil vapour and steam, which, by providing a more even deposit of carbon on the catalyst, will enable the catalyst bed temperatures to be controlled more easily.

Better Distribution

By having the gas inlet to the catalyst vessel centrally placed above the catalyst bed it is expected to obtain a better distribution of steam-oil vapour mixture than is possible in the smaller plants with the gas inlet at the side.

Instead of burning gas in the plant for heating purposes provision is made at Ponders End for burning either oil, or the tar produced by the plant. Cyclically operated burners are positioned at the top of the vaporizing chamber or above the brickwork in the steam preheater. There is also a hand-operated burner at the base of the air preheater should additional heat be required at this point. An important addition to the plant is the waste heat boiler which will extract heat from the blow gases. On leaving the steam preheater the blow gases pass through a hot gas valve, and then flow through the waste heat boiler, which is designed to generate steam at 210 lb. per sq. in with 100°F. superheat. An oil/tar burner is placed in a combustion chamber at the inlet to the waste heat boiler. This burner will be full on during the run, but during the blow the amount of oil burned will be reduced to one-third of maximum. The waste heat in the blow gases is insufficient to provide all the process steam required by the plant, and by this means the steam available will be increased to the level required. The steam is expanded through turbines used to drive the main air blower, the process oil pumps, the boiler feed pumps and certain of the water circulating pumps.

As the period of maximum supply of steam from the machines does not coincide with the period of maximum usage for process, a steam accumulator is provided into which the turbines exhaust at 10-25 lb. per sq. in. By this means the plant is made self-supporting in steam. When the second unit is erected, the same waste heat boiler will be used by both, as the cycles will be stepped. It will then be necessary to install a small oil-fired Economic boiler to raise steam to cover the increased process steam requirements, and the auxiliary air blower, used for the oil burners in the waste heat boiler, will then be used for the Economic boiler, since the waste heat boiler burners will no longer be used. When two units are running there will probably be an excess of high pressure steam, for the same auxiliaries will be used and they will not require twice the amount of steam to operate them. If the amount of steam available justifies it the excess will be passed through a turbo-alternator to generate power, which can then be used to operate the electrically-driven auxiliaries.

The gas cooling and cleaning plant is orthodox, comprising a flat base wash-box, a direct contact washer-cooler using water re-circulated over a cooling tower, and a naphthalene washer. It is possible that, as a result of experimental work carried out at York, the steam requirements of the plant for process will be considerably reduced. A large proportion of the steam which was initially used was not required by the reaction but was simply a heat transfer medium and as such was used for moving heat through the plant at the end of the oil injection period. Clearly, if this steam could be replaced by air, considerable economies would be obtained. By using air for this purpose at York, results have been obtained which indicate that the steam consumption can be reduced to approximately 50% of that formerly required. The technique is not yet fully proved, and a further period of operation will be necessary before these results are definite.

It is intended to use the tar produced in the burners on the plant. Emulsion formation will be suppressed as far as possible by circulating a surface active agent with the cooling water, but if this is not satisfactory the tar will be dehydrated in an autoclave. Experience at York has shown that surface active agents such as Amine 220 and Bitran TC are quite effective in producing tars having a water content of from 5-10%.

It is anticipated that the following results will be obtained from the Ponders End Segas plant, using heavy oil (950 sec. fuel oil—235 centistokes):—

Output	3.6 mill. cu. ft. per day per unit.
Caolrific value	515 B.Th.U. per cu. ft. (30 in. Hg. 60° F. sat.)
Total oil consumption	4.54 gal. per 1,000 cu. ft. (all steam raising included) 4.35 gal. per 1,000 cu. ft. (back blasting and all steam raising included). 4.02 gal. per 1,000 cu. ft. (back blasting, tar used for firing boilers, and including all steam raising).
Steam (for all purposes)	65 lb. per 1,000 cu. ft. without back blasting. 45 lb. per 1,000 cu. ft. with back blasting.
Tar produced	Approximately 10% of volume of oil used.
Power	0.32 kWh. per 1,000 cu. ft. of gas.
Labour	2 men operate 2 units.

The ONIA-GEGI Process

While development work had been proceeding in this country with the alkali catalyst, l'Office National de l'Industrie de l'Azote (O N I A) in France had produced a nickel catalyst, proved to be successful in connection with the production of synthesis gas by the gasification of hydrocarbon oils, and Gaz à l'Eau et Gaz Industriels (G E G I) saw the possibility of using the same catalyst in a cyclic plant for the production of town gas.

A number of British gas boards became interested in this process, which became available in this country through the parent company of GEGI—namely, Humphreys & Glasgow

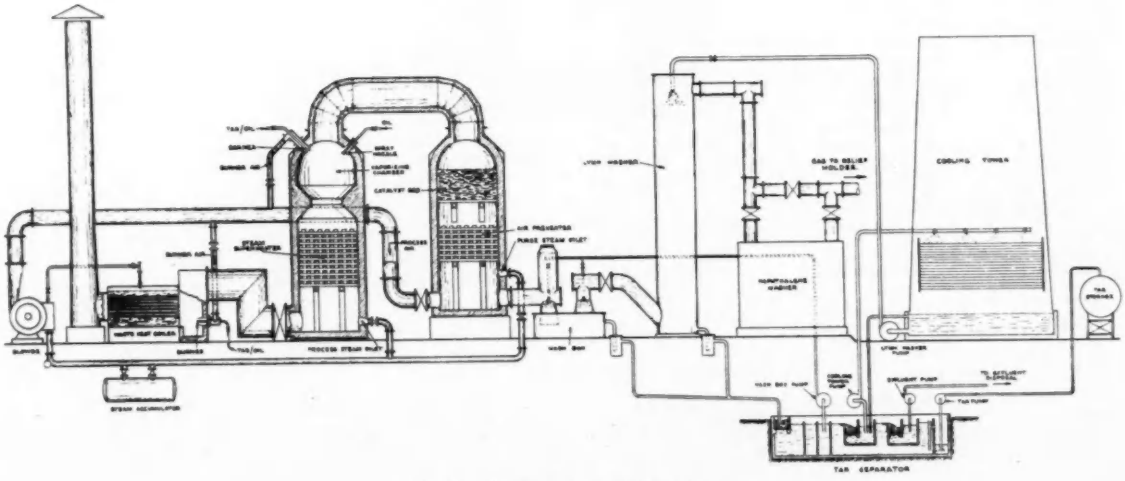

Fig. 2. Segas plant, Ponders End.

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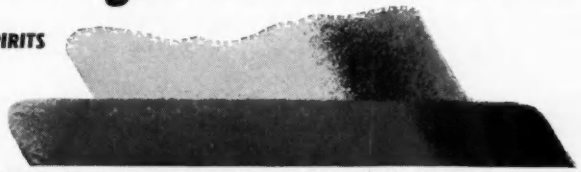

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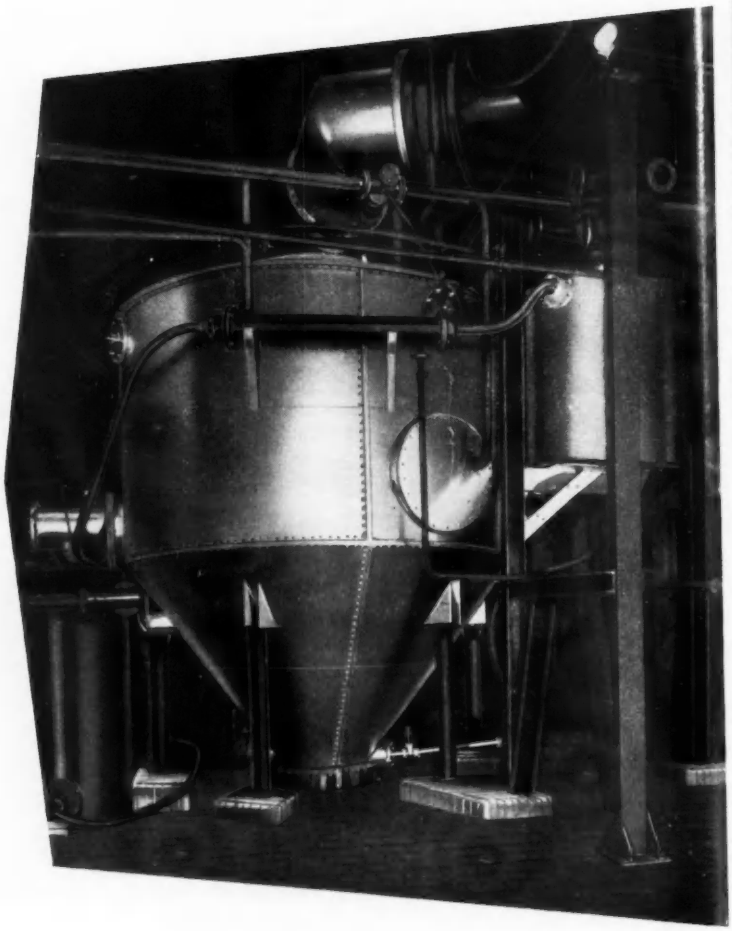

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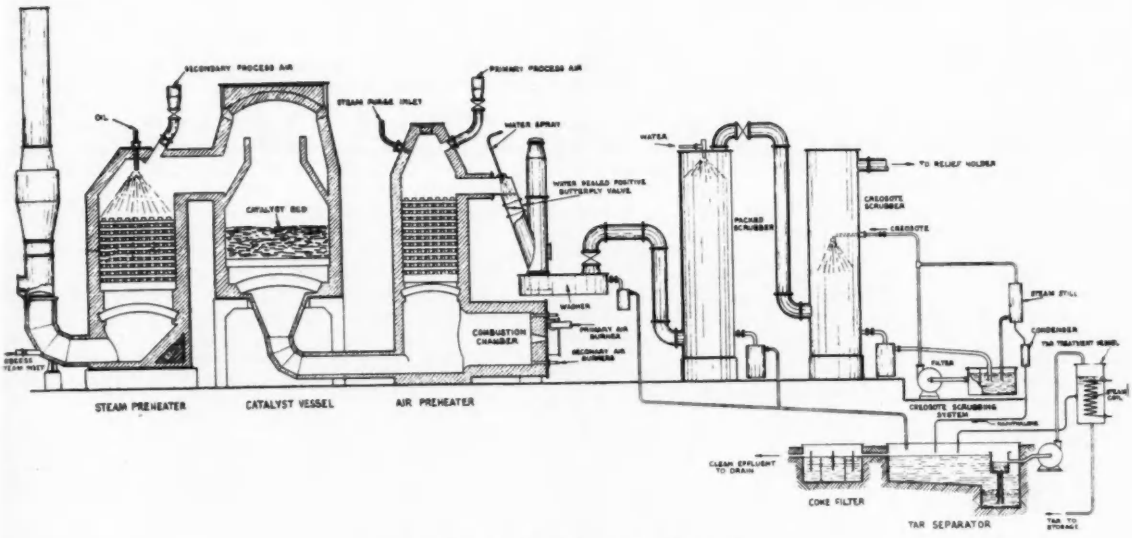

Fig. 3. ONIA-GEGI plant, Bedford.

Ltd. The West Midlands Gas Board was the first to apply the plant to British practice with available British heavy oils, and as the experimental work at Sydenham and York has provided information for the design of future Segas plants, so in like manner the work at Solihull and Stafford has influenced future design of the ONIA-GEGI process. Much has been learnt about oil distribution and the all-important function of control of catalyst temperature.

In neither type of plant is oil now directly sprayed on to the catalyst, but is injected into a vaporizing chamber against counter-current flow of superheated steam. This is expected to produce better oil distribution and to save catalyst disintegration previously common in the upper layers.

The regenerative principle, save under exceptional conditions, would appear to provide the cheapest therm, and the design features are now more thoroughly understood. Much has yet to be learned in regard to the true function of the catalyst. The surface area of the catalyst and the space velocities through the catalyst produce important effects in gas output and composition, and some measure of trial and error is necessary in determining optimum conditions with the varying types of feed stocks. Under unsuitable conditions of operation an undue proportion of carbon is formed and the production of naphthalene and of difficult tar emulsions has been experienced, but all these problems have been found capable of resolution.

A number of boards have large units of the ONIA system either in course of construction or on order. My own Board has a small plant of 300,000 cu.ft. a day being fabricated for Thetford, in Norfolk, where it will replace a small obsolete unit of horizontal retorts and blue water gas, and remain the sole means of providing town gas.

Other plants of 2 and 3 mill. cu.ft. a day capacity are on order for other districts. Fig. 3 shows diagrammatic arrangement of a 2 mill. cu.ft. a day regenerative unit for the Bedford works.

With heavy oil conforming to the following specification:—

Viscosity	800-1,000 sec. Redwood No. 1 at 100° F.
Conradson carbon	Not more than 10.5%
Sulphur	Not more than 4%
Asphaltenes	Not more than 3%
Ash	Not more than 0.05%
Sp. Gr. at 60° F.	0.95-0.97
C/H ratio	Not more than 7.6

Producing gas at 480 B.Th.U. per cu.ft., the following fuel and steam consumptions are anticipated:—

Oil consumption:	
(*a*) Process and heating, gal. per 1,000 cu. ft.	3.80
(*b*) Process only	3.50
Steam requirements raised from external sources: lb. per 1,000 cu. ft.	56

Propane, butane and 'tail' gases are now becoming available in greater quantity from the large oil refineries built in this country in recent years. They form a potential new raw material for the gas industry provided they can be obtained at a favourable delivered price per therm. Some capital plant is necessary to enable their use—namely, tank storage in respect of the L.P. gases, and mixing and/or reforming equipment.

In regard to continuous non-catalytic reforming plant perhaps the most interesting unit now available in this country, but, as far as is known, not yet in use, is the Koppers-Hasche process. The Woodall-Duckham Construction Co., Ltd., are licensees in Europe of this American process. The plant is low in first cost and entirely automatic in action, and would appear to have a special use in meeting sudden peak load conditions. However, because of the high gravity and other characteristics of the gas made, the proportion that can be mixed with town gas produced from orthodox town gas plant is limited to the order of 10-15%.

The hydrocarbon gas (propane or butane) passes through a venturi injector which inspirates a pre-determined quantity of air, and the gas air mixture then flows through a four-way reversing valve system into a regenerative reformer. The tile mass of the regenerator is so divided that the air-gas mixture is first heated to auto-ignition temperature before burning in a small combustion chamber and thence to the second section of regenerator where sensible heat is recovered. At regular intervals the direction of flow is reversed. The Hasche tiles are made of high-purity alumina and are laid face-to-face to form a multiplicity of small parallel flues extending the length of the regenerative furnace in the two divided sections.

Cost of Gas Production

The final cost of gas into holder is governed by cost of raw materials, process costs, return on residual products, capital costs (interest and depreciation) and the load factor at which the plants are employed. Raw material costs, particularly coal, vary widely with plant location. The average costs of coal carbonized between the twelve area boards, calculated from figures given in the last published Report of the Gas Council, show a variation from 80s. 8d. to 101s. 5d. per ton, and the variation is obviously greater when costs are shown for individual plants. For instance, in the Eastern Gas Board over the same period the lowest cost is for a works on the seaboard which can take vessels with 1,250 ton freights with a delivered cost of 89s. 9d. per ton, and the highest, ignoring the very small works with no special handling facilities from railhead, is 112s. 8d. per ton, in circumstances where there is a long haul from the collieries. On the other hand, delivered oil prices are more uniform due to the operation of a zonal system of charges. Moreover, storage and handling are simpler and can be mechanical even with the smallest units.

The return for residuals influences the cost of coal gas, and as the main residual is coke, the coal/coke price ratio has a considerable effect on gas production costs. The higher this ratio the more profiable it is generally to have more of the potential therms in the coal substance as gaseous therms by supplementing carbonization by gasification of the coke. Determination, therefore, of the type of combination of plant and the raw materials best suited to give optimum economy in day to day working is a subject for local consideration.

An analysis of the estimated costs of producing gas at two of the larger stations of the Eastern Gas Board, by various processes and at varying annual load factors, indicates that catalytic oil gasification at all loads for new plant to-day provides the cheapest town gas at these two works, but it must be emphasized that in each the delivered cost of coal is well above the average for the country.

Future Considerations

The constantly rising price of coal is a cause of much anxiety in the gas industry. If the principal product, gas, is to maintain its competitive position against such a trend, the price of coke will have to rise materially. At such prices coke will sooner or later no longer be able to hold its position as a fuel for domestic space heating, and for economy with convenience consumers will turn to the mobile fuels, gas, electricity, and oil. Oil prices have shown more stability, being less influenced by the element of wages costs, and a big increase in use is envisaged in this country, in which the gas industry will participate.

There are three phases in the industry's attitude to oil products, the first being the use of gas oil as an enriching medium to seasonal and peak load gas produced in C.W.G. plants, the second being the transitional stage on which we are now embarked with local plants providing gas from the catalytic gasification of heavy oils and perhaps other petroleum products which are temporarily out of balance on the market, and, thirdly, large installations of gas producing plants closely integrated with the refineries at the ocean terminal ports of the crude oil. Such projects are under way at the Isle of Grain, and likely to develop elsewhere.

The author is of the opinion that collateral development of large scale high pressure gasification plants on the Lurgi principle may well take place with plants sited in the Midlands and elsewhere where suitable coals are available. From a strategic point of view, and in consideration of national defence, there will be many advocates of the policy that our industry should not rely too much on imported oil, and coal gasification is in line with such views and in keeping with the quality and type of coal likely to be available to it in the future.

The steel industry has the first call on coking coals for blast furnace coke, and the conservation of such coals will no doubt be aided by an increase in blending methods. The gas industry will absorb such gas as is available from coke oven plants.

The extent to which the gas industry will build further carbonizing plants is conjectural. Much depends upon the relative movements of coal and oil prices and the financial return that can be expected from coke of the quality acceptable to the domestic market.

Soil Mechanics and Foundations

SAYING that he did not want to be an alarmist, Mr. M. W. Leonard, of Soil Mechanics, Ltd., began his lecture entitled 'Soil Mechanics in Relation to the Design and Construction of Foundations,' given to the Institution of Gas Engineers, Eastern Section, on February 16, by showing slides of buildings which had suffered because proper consideration had not been given to the soil on which their foundations rested.

The role of soil mechanics, Mr. Leonard explained, is to safeguard against failure and against excessive settlement of foundations.

Soil conditions may be investigated by taking samples and examining and testing them in a laboratory, or by testing in situ.

In the first method, the soil may be obtained by means of trial pits or by boring a hole in the ground and lining it with a steel tube to enable samples to be taken with special tools.

Methods of in situ testing vary with the soils to be examined. Soft to firm clays can be tested by an apparatus called the vane, which enables the resistance to shear to be measured.

As the bearing capacity of foundation in sand and gravel depends largely on the degree of compactness, this factor should be measured in the field. This may be effected by probing which is also widely used for delineating strata.

Where samples are treated in a soil mechanics laboratory, the tests, generally, are to determine certain index properties and strength values.

The strength of clay is usually measured in terms of its cohesion or shear strength, which may be determined in a triaxial compression cell. Clay is also subjected to consolidation tests.

The difficulty in testing non cohesive soils such as sands and gravels in a laboratory lies in the fact that they are in disturbed condition and consequently the testing is limited to a few tests such as particle size analysis, permeability, and shear strength. Rocks are subjected to compression tests and petrological examination.

Soil and site conditions, together with the dimensions of the structure, will determine the nature of foundations. Piling forms a widely practised method of construction in difficult ground conditions, but there is no pile which will meet all soils conditions, and the load-carrying capacity of the pile depends primarily on the soil in which it is founded.

The relationship between the ultimate bearing capacity of the pile, that is the load at which it will fail, to the working load of the pile, is known as the factor of safety, and this generally, should be of the order of two to three.

Construction below ground water level calls either for providing a 'cut-off,' using sheet piles, or for dewatering, usually by pumps. A flow of water through the ground can be accompanied by a flow of fine soils which, if they come from below an adjoining structure, give rise to serious settlements.

Another important aspect of soil mechanics in the construction of foundations in sand and gravel is an understanding of the various injection processes for forcing grouts and chemicals into the voids in such strata.

At the conclusion of the talk, **Mr. Eric G. B. Williams,** Divisional Engineer, Norwich, who mentioned that he was known in Norfolk as 'Foundation Willie,' expressed appreciation of what Mr. Leonard had said, and contrasted his scientific approach with the old 'spit and guess' methods of deciding on foundations.

After quoting instances where soil survey had been of considerable assistance in his own area, he raised a question regarding the factor of safety (which Mr. Leonard later explained was closely related with the question of costs) and called for clearer notes on soil when reports were being prepared for builders.

The need for accurate site supervision was stressed by **Mr. W. Morland Fox,** Joint Managing Director, W. J. Jenkins and Co., Retford. The operator, he said, did not always understand what he was doing when ground was being investigated.

He also called for clearer advice to builders, and questioned whether soil mechanics was a science or a growing art.

Mr. Alexander, of Wests Piling Construction Co., told how having read an article on foundation settlement due to shrinkage resulting from the proximity of the roots of poplar trees—a factor which Mr. Leonard had illustrated with a slide—his wife had rushed from the house and torn up four poplars growing at the bottom of the garden. He raised questions about seasonal variations affecting soils, vane tests, and undisturbed sample tests.

A vote of thanks to Mr. Leonard was proposed by **Mr. K. C. Rees,** of Watford, who stressed the importance of soil mechanics. He raised a question regarding the stabilising of sub strata, which Mr. Leonard afterwards said was a subject of which more would be heard in the future.

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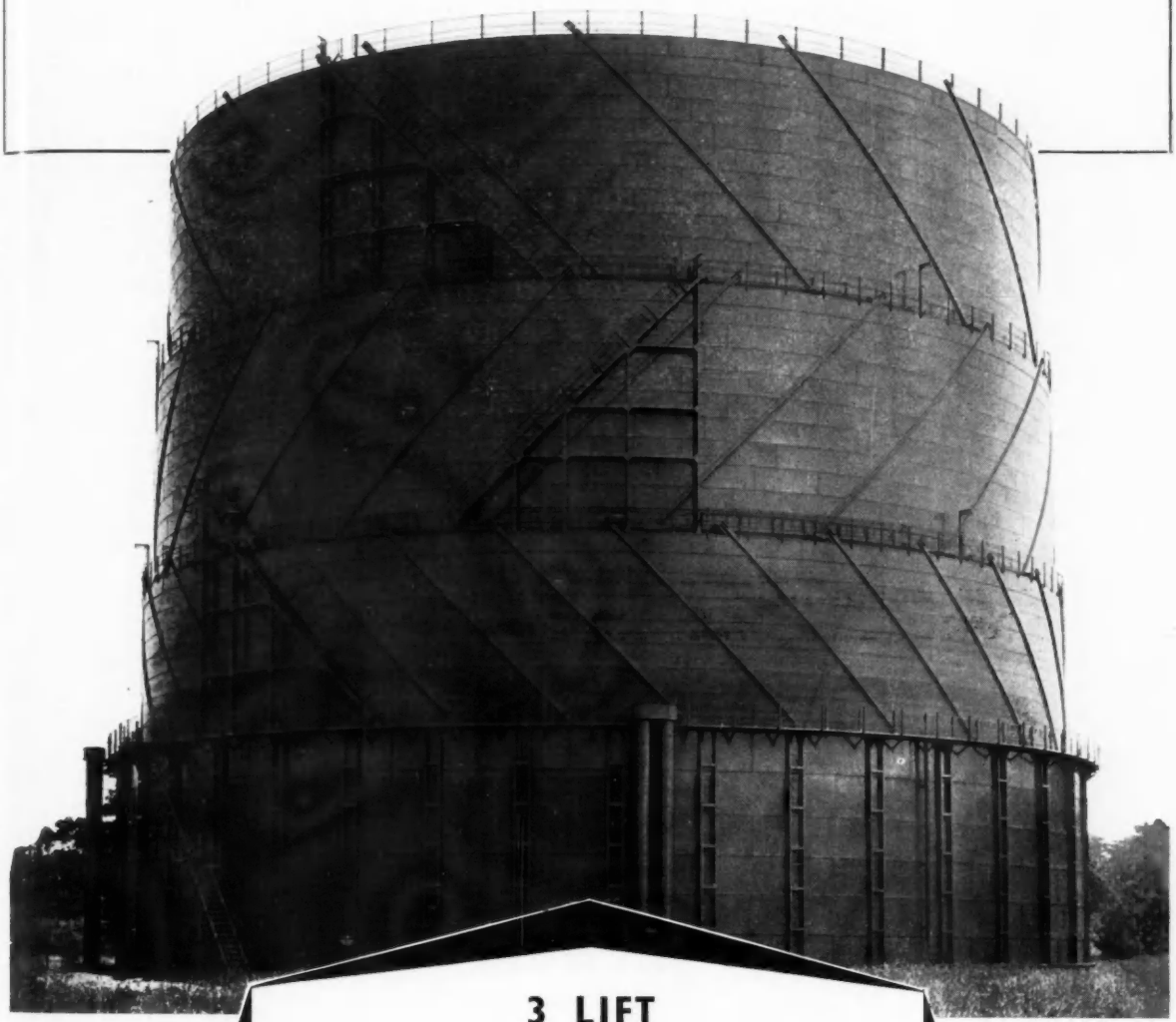

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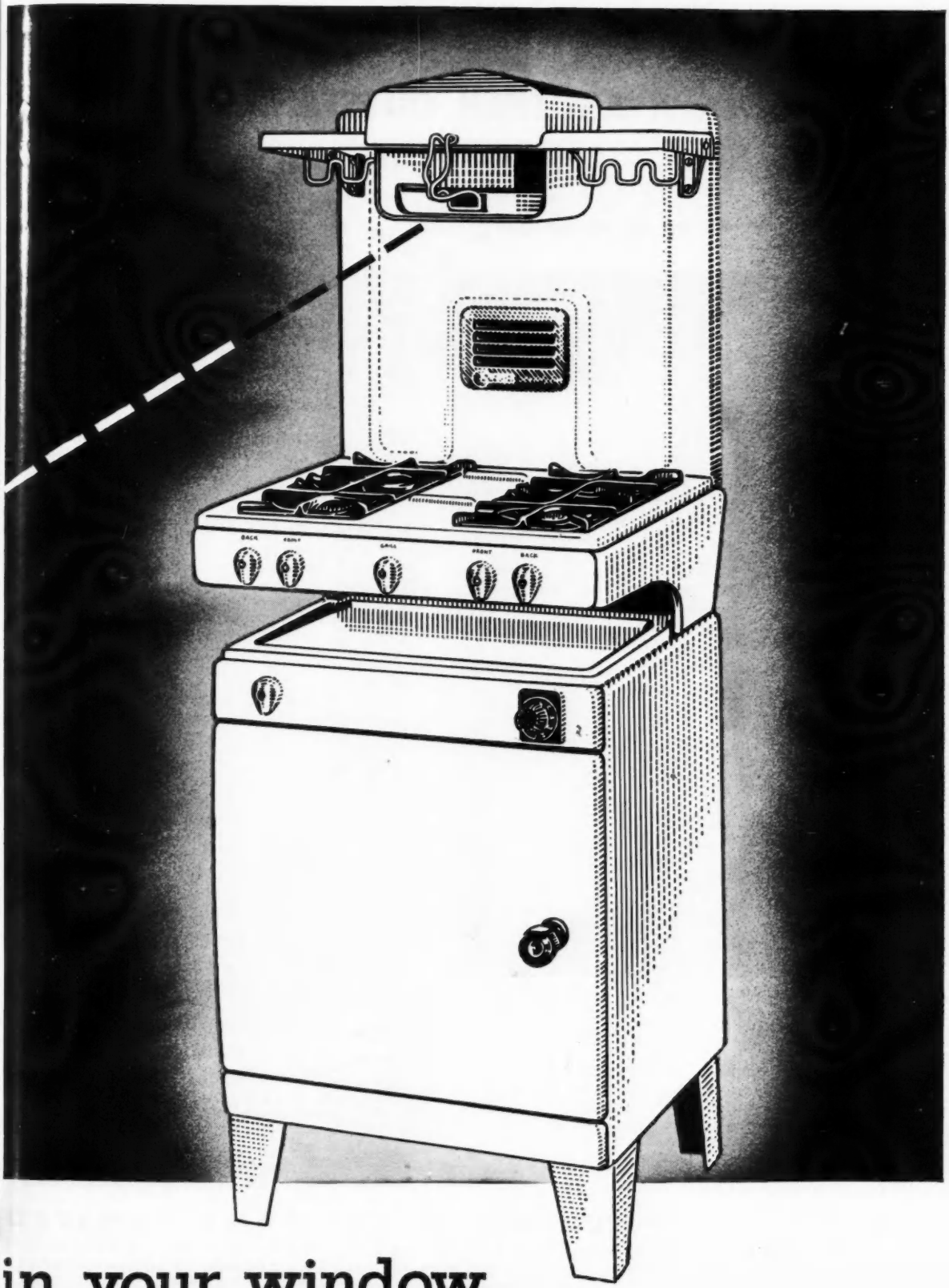

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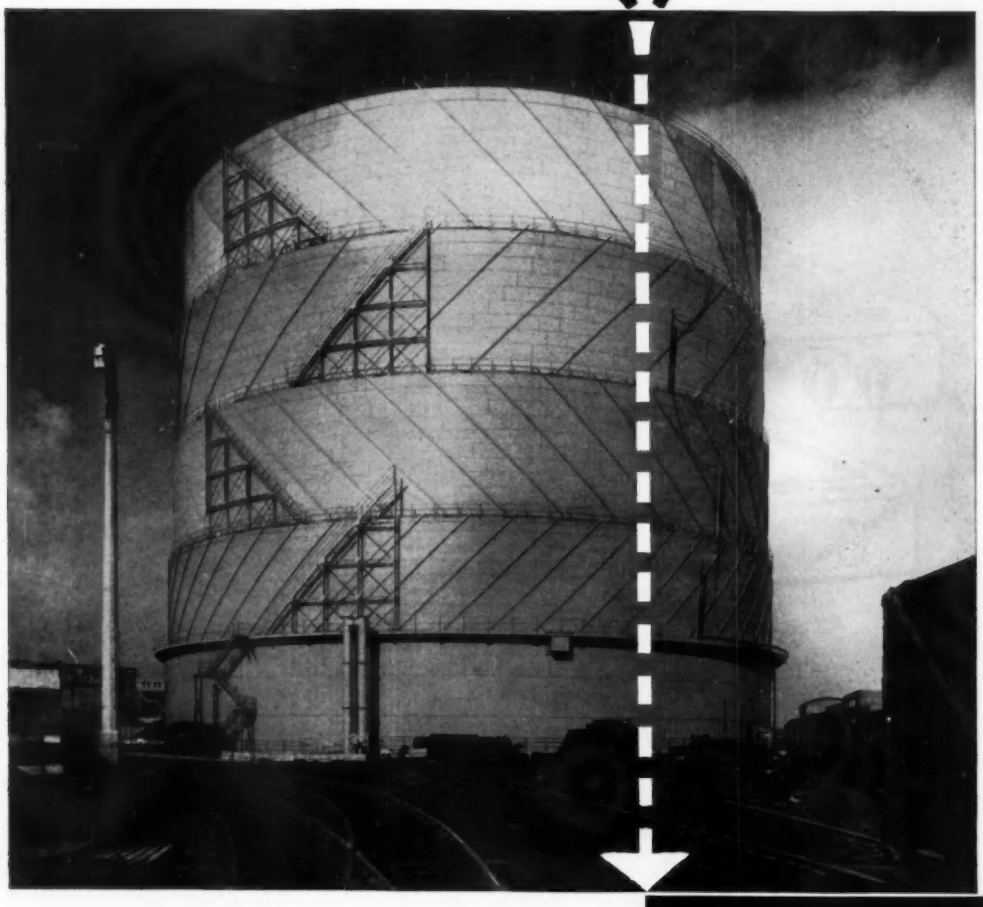

Swan Village 5,000,000 cubic feet Gasholder. Photograph by courtesy of the West Midlands Gas Board and Clayton Son & Co. Ltd.

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Techniques of Management*

by

J. C. INGRAM,

Secretary, West Midlands Gas Board.

THE leaders of our industry gained their rich and varied experience in conditions which no longer exist under nationalisation. It has to be considered whether, under the new conditions, their potential successors are being given sufficient opportunities and encouragement to acquire as valuable an experience. It may be that the new conditions pose problems for the solution of which new skills are needed. Or that the particular environment in which the former managers of undertakings rose to maturity is no longer even desirable. Specialization of function has inevitably followed greater centralization of control. Thus, limitations have been imposed on the all-round development of the specialist officer.

Large-scale Organization

Before vesting day, some undertakings took advantage of the economies of large-scale organization, which were open to them, *e.g.*, specialization of staff, base-load, production, integration of distribution, and the costing controls needed for larger-scale working, together with centralization of purchasing, accounting and administrative functions. In others, the pattern was varied but administration, for the most part, was in the hands of engineers and managers who had risen to those positions by the usual sequence of practical training combined with university studies, diploma courses or Higher National certificates. In many cases, much of the clerical and accountancy work was done by the permanent staffs of the local authority or company concerned. Promotion was usually achieved in progressive stages by an engineer moving about the country from job to job and learning in the natural course of events to appreciate the virtues of differing procedures and methods. This wider experience of management enabled him to take over a more senior job. In the course of time he became concerned more with the administrative aspects of management and delegated the more technical duties to younger men.

This system worked well within the limits set by local circumstances and characteristics. The head of an undertaking usually enjoyed a fair measure of autonomous power but remained primarily an engineer. Nevertheless, his was the judgment sought when questions of plant, tariffs, commercial policy, and staffing were considered.

Expanded Administration

Under nationalisation the sphere of administration is expanded and the former managers and their potential successors now have to cope with a wider range of problems and a vastly greater scale of operations. It is not surprising that there is little opportunity for them to have the leisure for the calm reflection so necessary for planning and the wider view. Too often nowadays a manager finds himself in that position beloved of the business administration schools, forced to assess a complex situation without delay, with incomplete data provided at third-hand, and give a decision. And to accord priorities, not merely to the immediate production, commercial, financial, or administrative needs, but priorities on his time.

Again, the management schools in their teaching, especially when using the case study method to which I shall refer later, simulate those conditions in order to help the student to learn and think for himself, and to decide his own priorities against time. But this is not to encourage decision-taking by hunch—however tempting that may be—but to assess the usefulness of modern techniques of management in practice. Such techniques, for this purpose, have one common aim, that is to present management with the information it needs in order to control and guide the business, *i.e.*—information offered on a quantitative basis, as far as is humanly possible.

Executive Promotion

Promotion for the executive today, therefore, lies along different lines because the circumstances are so different. Conditions are now necessarily more controlled and systematized. Rightly so, I believe, when one looks at the responsibilities shouldered by a typical area gas board. To take my own Board as an example, it has a turnover of about £30 mill., serves over 1 mill. consumers in six counties, and employs over 13,000 employees of all grades. The day-to-day work of the Board is controlled by seven divisional general managers to whom the Board has delegated wide powers of responsibility as being the 'line' managers. Their work is supplemented by headquarters specialist officers, a 'staff' function which provides expert advice and co-ordination of overall area policy in given subjects. The day-to-day supervizing and policy-formulating function of the Board itself is carried out by the Chairman and Deputy Chairman, who as 'working directors' report to the full Board monthly.

In parenthesis, this 'line and staff' relationship can sometimes lead to misinterpretation but no formal organization chart ought to be expected to tell one precisely what this or that officer does in relation to his neighbour. Which is as it should be. There is something to be said for giving each executive a 'mandate,' *i.e.*, for putting on paper exactly what he is required to do so that anything not included in his mandate is the concern of somebody else. *But, in practice, this would be a pettifogging cramping of one's style and would ruin the usefulness, and pleasure, of working in harmony with others who are also trying to do a good job of work.*

Pattern of Control

I have touched on these aspects of organizational problems because by so doing we can be reminded of the divisional general managers' pattern of control which resembles, in some ways, the pre-vesting pattern of senior management which I mentioned earlier, and the specialist function as its complement. At divisional level, however, as you well know, a general manager needs to control specialists, and although it may be relatively easy to spot the likely contenders for promotion along any of the specialist channels, it is more difficult to judge who is likely to challenge for the higher managerial posts.

In the changed conditions, how can latent talents be developed? Can budding top managers be taught what, in these days, they need to know? Is it true that the best will automatically rise to the top and that good managers are born and cannot be made? I am not considering only the problem of top management succession. A happy and efficient (although those two adjectives are interdependent) ship is not made so only by the inspiring leadership and all-seeing wisdom of its captain but also by the care he takes in training and looking after his junior officers—and his petty officers and leading hands, most of whom are specialists. The training and encouragement of a board's junior and middle management, no less than of its numerous foremen, is equally important if the organization is to be efficient.

Training in Management

It may be true that, in a crisis, *the* man is found, and that the best will rise to the top. But many good men remain as good middle managers and, as such, are quite indispensable. Whatever a man's talents of leadership and technical ability may be, there is no doubt that they can be guided and helped

* From an address to the Midland Junior Gas Association, Birmingham, on March 6.

to develop by imaginative training in management. One cannot, of course, teach people to manage and there is so much that can be learned only by 'doing,' but it is fair to say that most gifts can be improved by training. It is this conviction which has led many British industrialists to embark upon all kinds of training schemes which might have horrified successful captains of industry of pre-war times.

As you know, my own Board, in common with others, has steadily built up a comprehensive series of education and training programmes, ranging from various vocational courses of training to supervisory and executive development studies.

A Board is bound to control and guide the organization but those words 'control and guide' need be no deterrent to any man doing a good job of work at any level. The trick is in seeing that each manager, superintendent, and foreman not only knows what part he is expected to play, but is given encouragement and the management tools to play it well.

It is a truism that rights also carry responsibilities. Delegation means giving an officer responsibility for doing a specific job, but it becomes a pointless sort of exercise if he is not also given some guidance with it. And this guidance, in turn, is bound to be dictated to some extent by the overall policy of the Board.

In America, it was this mutual understanding and enlightened attitude on the part of management at all levels that impressed me most. Delegation of responsibility could be passed right down the line to the smallest units of a company because each supervisor knew what was expected of him and was, in consequence, proud of 'running his own show.' The secret lay in offering a practical incentive and in cost-consciousness. Each chief officer, section head, and supervisor not only took an active part in helping to frame the company budget of operations, but also realized that his performance would be judged on how he kept to the plan or could satisfactorily account for variances from it.

Let it be remembered that the procedures which made that sort of attitude of mind possible are highly standardized and yet are not considered irksome nor a device by top management to keep supervisors on their toes. They have learned to make use of the cost accountant and to harry *him* if the control figures they need for effective supervision are not regularly and speedily provided. Perhaps there is a moral there for our engineers and others who tend to regard all accountants as mere nagging nuisances!

It is no part of my purpose to 'explain' any particular so-called 'technique of management.' Some techniques need, for their efficient utilization, an 'expertize' by the people engaged, full-time, in applying them. As tools the concept of each is basically simple in spite of the grandiose titles given to some of them.

WORK STUDY

'All Right for Any Other Industry'

I would like, however, to refer to one of them—work study. There is a danger of dismissing work study as being all right for any other industry but our own and that any stop watch device is bound to fail in present-day conditions, when it is difficult to hold the labour we have. But time study, as such, is merely a part of work study, and many operations, in all sorts of applications, have been simplified, and manual effort thereby made more effective, without making use of it. Experience has usually shown, moreover, that when the objective and the technique of the work study officer is explained to the men and their unions little further difficulty arises, especially if the outcome is a successful incentive scheme.

A popular definition of work study is that it aims at the most effective use of plant and of human effort and a reasonable work load for those employed. It is divided into two main techniques, method study and work measurement, the objectives of the first being improved processes and procedures, improved layout and design, better working environment, more efficient use of material, machines and manpower, and economy in human effort and reduction of fatigue. Work measurement is the determination of the proper time to be allowed and of the effort required for the effective performance of a specified task.

Work study is frequently referred to as a scientific technique. This is, perhaps, psychologically unwise, as it suggests that it is only for the select, highly talented few to practice. It is certainly scientific in that it involves logical analysis and the method of science. In essence, however, it is applied common sense, and I think it is best regarded in that light, if it is to be understood and accepted at the levels where it matters most.

One of its most important uses is in setting standards of performance to provide 'control' information, which is essential to the progressively-minded works manager who wishes to raise his operating standards from good to excellent. It makes it possible to provide a direct standard against which to measure output. It sets standards of performance for indirect labour. Its use can improve working conditions and reduce fatigue—a most important means of reducing the number of grievances and high labour turnover. It is successfully applied to questions of plant lay-out and handling of materials (e.g. coal and coke handling) and, very importantly, to job evaluation.

Practice as a work study officer affords one of the best examples of on-the-job training for higher management. Moreover, it makes possible effective use of job rotation. Not only does it call for sustained use of critical faculties, meticulous observation, and the maintenance of an inventive and flexible mind, but a successful work study officer must get on well with people. Also he will learn through detailed analysis about many functions which, as an engineer in the normal specialist channels, he would encounter mainly in theory. The Americans use the field of work study, or industrial engineering as they call it, as a training ground. Significantly, they also interchange cost accountants with industrial engineers, as the functions are truly complementary. After a few years in either field, a man is better fitted to take a promotion in the line management, and competition to acquire either experience is very keen.

Organization and methods work is basically identical in principle with work study and I do not wish to elaborate its importance. Both functions, as practised by my own Board, are very closely related and each keeps the other 'in the picture' by exchange of ideas and information. These men are already demonstrating that the old and tried methods are not necessarily the best and that changes in methods do not necessarily create difficulties without ensuring practical solutions to problems.

The effective deployment of each is probably the best answer to public criticism of monopolistic utility concerns like ours that 'it is easy to make small margins of profit, yet still be inefficient by carrying unnecessary costs.' Many attempts have been made to find yardsticks of efficiency for the nationalised industries but all have been unacceptable for one reason or another. The most convincing answer to the charges made is to show that the most modern tools of management used by any progressive business concern are also skilfully used by us.

I have not had time to mention the less tangible management subjects worth careful study, such as human relations and personnel policies, management communications and policy formulation—less tangible because they are concerned more with people and human behaviour. The use of the case study method can be most effective for getting maximum benefit from these studies. The case method is a discussion method of teaching which compels a student to think for himself, and a 'case' consists of factual data describing an actual business 'situation' involving a problem and a solution. Properly handled, this method of presenting a human problem in business can be quite fascinating—and chastening—if only to convince oneself that there are other points of view to be respected especially if six 'solutions' to the problem posed are offered, and any or all of them may be right! Such a realization can do much to make joint consultation a truly mutually beneficial exercise.

To sum up, I have tried to suggest that jobs can be made more interesting and meaningful by finding time during the distractions of running a full-time daily job to make a systematical appraisal of contemporary aids to better management. I have avoided using the word 'productivity' because I hope it has been implicit in what has been said.

DISCUSSION

12,000 Managers a Year Needed

The President, **Mr. S. C. Crathorn,** spoke of the need in industry for better management at all levels and said it behoved them to realise the gas industry was no exception. He thought

was clear there was much in management studies that could sefully be taught and the subject deserved greater attention. t was estimated that British industry, which comprised about 00,000 to 450,000 managers, required an annual replacement f about 12,000 managers a year but there were only 3,000 tudents taking the management course. Referring to work tudy Mr. Crathorn queried its application to top management unctions but said he had no doubt of its interest for top nanagers. They were already able to see the benefits to be lerived, and some of the difficulties, from the work already eing undertaken by work study officers but he personally oped the principles would be applied more at the drawing oard stage from the point of view of planning and design.

Mr. K. E. Jones (Worcester) thought that the greatest lifference in the industry before and since nationalisation had een in the shift of responsibility. It seemed to him to be difficult job to delegate effectively if a board was to remain ltimately responsible for everything that was done at every evel.

Technical Competence Not Enough

Mr. D. J. Ward (Birmingham) said that he understood that in American industry, for which many engineers and technicians were trained each year, more than 70% of the people occupying the higher technical positions were appointed for their qualities of leadership, management and personality rather than on technical qualifications. This suggested that technical competence was not, in itself, enough for management development.

Mr. Ingram said it was difficult to generalize about the weighting of the virtues which had been mentioned but they were essentially those on which any sound promotion policy was based. Many American firms were better able to assess those qualities as a result of their policy of requiring graduates to gain shop floor experience and then to contend for promotion with non-graduates having equivalent practical experience.

Mr. F. L. Atkin (Birmingham) referred to certain of the recommendations contained in the Fleck and Herbert reports especially with reference to the proportion of managers to total employees. He wondered to what extent those recommendations could be applied to the gas industry; and on the general question of comparison, thought that the figures of productivity for this country were often shown in a poor light because of the relatively fewer manual workers engaged in specific operations than their counterparts in Britain.

Mr. Ingram agreed that it was misleading when attempting to establish absolute differences of productivity to use such ratios as those Mr. Atkin had mentioned.

Private Enterprise Outlook

Mr. H. Mellors spoke of the management outlook of organizations in private enterprise and thought that a nationalised industry would find it difficult to engender a similar management consciousness down to the lowest levels of supervision without relying mainly on financial incentives.

Mr. Ingram agreed that in present conditions financial incentives carried great weight but they were not the only ones. Many were activated by a sense of public service and pride in doing a job well.

Mr. H. B. Bassett (Birmingham) thought that it was inadvisable to attempt to introduce financial incentives without first surveying the method and content of the job to be done.

Mr. W. B. Dobson (Birmingham) said if they were going in for work study it should be done in a big way but at present they were only nibbling at it.

Mr. J. A. W. Stretton (Senior Vice-President) proposed a vote of thanks to Mr. Ingram and spoke of the stimulating range of topics raised in the discussion. He thought few doubted the advantages accruing from taking a systematic approach to management studies but nevertheless he thought there would always remain the problem of the manager who was psychologically incapable of delegating work to subordinates and queried whether management training could ever eradicate such a failing.

The Distribution of Gas in Birmingham

The following is a shortened report of the discussion which followed the presentation of the above paper by Mr. R. M. Nelson to the Midland Junior Gas Association.

IN reply to a number of points raised by **Mr. G. W. F. Cockayne** (Wolverhampton), **Mr. Nelson** agreed that two-stage governing on the high pressure system would not be thought necessary these days, but stated that the governors in question were among the earliest installed in this country and everything had been done to make the installation as foolproof as possible. On inferential metering, he stressed the importance of simulating design conditions in practice if worthwhile information was to be obtained. Mr. Cockayne queried the value of torque spanners and while admitting that with the introduction of the die-cast bolt the use of these appeared less important, Mr. Nelson said that he could not see any valid reason for their being discontinued. Mr. Cockayne also asked whether it was in fact true that, having satisfactorily met the testing requirements under hydraulic conditions, a main could be tested with air at just over its working pressure. Mr. Nelson replied that this was quite clearly laid down in the Institution recommendations referred to in his paper.

Mr. B. G. H. J. Hawkings (Coventry) emphasized the need for a high standard of workmanship. He thought that in the past some people in the industry had not been sufficiently impressed with the importance of distribution and had felt that it could be carried out by anybody. He was glad that Mr. Nelson had clearly indicated in his paper the various facets of distribution activities, embodying in many cases a knowledge of civil, mechanical, and structural engineering. Mainlayers of the past were real craftsmen and had set a very high standard. He was interested in the operation of the Longbridge Station and among a number of points raised, asked if the station, despite its very attractive operating conditions, could be justified financially. **Mr. Nelson** replied that the installation of the holders was a question of expediency and was really the only quick way of satisfying a rapidly growing demand in this section of the area of supply. The ultimate answer to the supply problem could only be provided by considerable mains extensions, and indeed these were in hand.

Another speaker referred to the testing of these holders, and Mr. Nelson confirmed that these site-built holders were hydraulically tested to twice their design pressure, the latter being 10% in excess of the maximum working pressure.

Mr. F. L. Atkin (Birmingham) proposing a vote of thanks said that, in his opinion, the reason for the soundness of the Birmingham system was that for almost 50 years the Birmingham Undertaking had had distributing engineers who were completely functional in character and were directly responsible to the management, and that sympathetic gas committees had not hesitated to provide the finance necessary to carry out the distributing engineer's plans. Mr. Nelson was the fourth of the distributing engineers who had held that responsibility but the one who was in office for the longest period of time during the 50 years was the first Honorary Secretary of that Association and its fourth President. Mr. James Hewett, who had contributed a considerable amount of knowledge to the distribution of gas in the Birmingham area; he would recommend anyone interested to read a paper given by Mr. Hewett to the Association almost exactly 44 years ago. It is most interesting to compare the figures given by Mr. Hewett and those given in Mr. Nelson's paper. The pressure of gas supplied to the consumer, for instance, was 25/10ths as compared with the present 50/10ths. The length of mains was 820 miles as compared with the present 2,500. The number of consumers was now 2½ times as many but the output had increased 3.5 times.

Underground Gasification

—*Ministry of Fuel and Power Publication*

IT is understandable that the layman, and particularly the politician, should cast longing eyes on the possibilities of producing gas from coal *in situ* without going through the tedious, expensive and often dangerous process of mining. It was from the misty regions behind the Iron Curtain, a term not then invented but none the less appropriate enough, that the first practical steps in this direction were reported. That was some 20 years ago although our own Ramsay had suggested them long before. This preliminary information indicated that the gas produced would be of low quality, but it was agreed that the process might be worthwhile when applied to seams, also of such low quality that it would not be worthwhile to mine them in the conventional way. And of such seams we understood there were many in Russia.

An idea of such 'apparent simplicity' was sure to attract attention and trials were initiated in several countries. These and the reasons for them are summarized in the introduction to the paper 'British Trials in Underground Gasification, 1949-55,' now issued by the Ministry of Fuel and Power.

Producer Gas

Essentially the process is directed to making producer gas *in situ*. The seam is ignited at one point and it is hoped that air pumped in at this point will cause the producer gas to penetrate a certain distance through the seam to another point where it can be evacuated. With more or less success this result has been achieved.

Several methods have been tried but, first, one will want to know what are the quality and quantity of the gas yield. Quite early in the report it is noted that the calorific value of the gas is lower 'than might be inferred from . . . . the constituent gases.' As far as can be seen from actual tests the calorific value does not reach 100 B.Th.U. per cu.ft. and it is admitted that 'below about 75 c.v. the gas is increasingly difficult to burn.' On the other hand it appears to have been used as low as 70 B.Th.U. in a reciprocating gas engine and it is anticipated than even lower values would be effective in a gas turbine, the most obviously practicable medium for its transformation into power. Sensible heat may, in favourable conditions, add 'a further 10-15 B.Th.U. per cu.ft. to the useful heat content of the gas.' Oxygen or oxygen-enriched air would obviously improve the quality. Cost considerations would determine their use.

As to gas yield, the best result seems to be about 200 therms per ton of coal, though the claim seems to be that 'well over 50% of the heat in the coal gasified has been made available at the surface as potential heat and a further 10% as sensible heat.' One would have thought that water would have been an almost insuperable difficulty, but this does not seem to have been the case. 'No reaction has been extinguished by water during the trials.' The heat of the reaction has generally been sufficient to vaporize the water, and such steam as may pass into the reaction is beneficial in raising the calorific value.

Intelligent Perserverance

The details of the several trials will be read with great interest. The story is the record of intelligent perseverance and tenacity. The difficulty is to create a channel through the seam along which the producer gas reaction can be propagated. The investigators were originally instructed that they must 'avoid using any manpower underground.' In general the work proceeds in pairs of boreholes. At the base of one the coal is ignited and from the other gas rises to the surface. The distance between them is called the 'span.' This appears to have been as low as 20 ft. and as high as 75 ft. 'Boreholes up to 50 ft. apart have repeatedly been linked and burnt through using high pressure air,' but this technique was abandoned (at least temporarily) in favour of electro-linkage and directional drilling. The process should be read in detail but briefly, in the former, 'electrodes are inserted down boreholes,' into the coal and a current is passed between them, heating the coal to carbonizing temperatures. The heated zone extends outwards from each electrode 'with a growing bias towards the opposite electrode. At an appropriate stage high pressure air is introduced at one borehole and the electrodes are withdrawn. Results showed that 'boreholes up to 100 ft. apart' could be successfully linked but the cost for electricity was high, amounting to an 'average for all full linkages of about 140 KVAH/ft. costing nearly 10s. per ft. as against 3s. for high pressure air alone. And the tonnage of coal usefully gasified 'has never exceeded 5 tons per yard or less than half the best achieved from drilled boreholes or following high pressure linkage.'

Directional drilling, involving the sinking of two or more small shafts—and a relaxation of the 'terms of reference'—seems to be the most promising technique, and trials are still proceeding. 'Shafts have been sunk and galleries drilled to gasify a panel of coal containing about 2,000 tons—1,200 tons of coal have been gasified producing gas at an average of 70 B.Th.U. per cu.ft.'

Altogether 'nearly 5,000 tons of coal have been gasified in some fifty trials and rates of over 20 tons daily have been maintained (sufficient to generate up to 800 KW) on single systems.' Costs appear to be fairly high, but these cannot be taken as final. 'The successful exploitation of underground gasification on full scale might be expected to reduce the volume of fuel imported, and the cost of imported coal' (which is stated to be about 6d. per therm) 'rather than indigenous coal may be the proper basis for cost comparisons.'

In an appendix there is a brief consideration and layout of what would be involved in the exploitation of a large installation based on directional drilling over such an area as one mile square. It is claimed that there is a total of 500 mill. tons of coal in this country in seams which are not worth mining and to which these techniques might be applied.

SMOKELESS AIR

THE Spring issue of *Smokeless Air*, journal of the National Smoke Abatement Society, records the amendments to the Clear Air Bill proposed or supported by the Society. Among those accepted are a provision that local authorities must be given prior notification of all new industrial fuel-burning plant, and that the Clean Air Council shall be a statutory body. The clause requiring grit arrestors to be used on plant burning ten tons or more of fuel per hour was criticized on the grounds that the figure was much too high, and the Society is gratified that the Government now proposes to reduce it to one ton.

Smokeless Air also comments on the 'unsuitable fuel' defence in cases of dark smoke emission, about which there was much controversy when the Clean Air Bill was in Committee. It quotes the statement to the Committee by the Minister of Housing and Local Government, Mr. Duncan Sandys, that he is 'sincerely desirous of seeing that this Bill shall not, when it emerges as an Act of Parliament, relax any restrictions which already exist.' It is pointed out that under the exising law there are several hundred byelaws in force throughout the country, which in respect of black smoke provide no defence whatsoever. The hope is expressed that the Minister will take this fact into account.

A question coming before the Society's Executive Council is whether to change the name to National Clean Air Society. It has been argued, it is said, that the word 'smoke' is now too limited, and 'abatement' too weak. If the proposal is approved it will be submitted to the next annual general meeting, to be held during the annual conference at Southport in October.

TRADE NEWS

Mobile welding unit

Croftshaw (Engineers) Ltd., announce the introduction of the 'Dual' welding trolley comprising a completely equipped 3 ft. by 2 ft. welding bench with fitters and pipe vice mounted at one end together with accommodation conveniently located at the other end for oxygen and acetylene cylinders. The complete assembly forms a compact and mobile unit.

The unit is manufactured from tubular steel with the bench top of steel plate. Provision is made for locking the bench when erected and the bottles are secured in position by two adjustable steel straps each fitted with tensioning device. Erection can be effected in 30 seconds and provides a solid and rigid working bench.

The 'Dual' trolley is fitted with 14-in. pneumatic tyred wheels positioned to provide maximum ease of movement, enabling bench and bottles to be moved from one location to another simply—in one operation and with minimum effort.

For installation and maintenance jobs where several pairs are employed on the same site, wasted time, due to queueing, can be avoided, and it has been proved in practice, claim the makers, that by equipping each pair with the 'Dual' trolley, erection and installation time can be reduced by as much as 30%.—*Croftshaw (Engineers) Ltd., 523, Ordnance Road, Enfield Lock, Middlesex.*

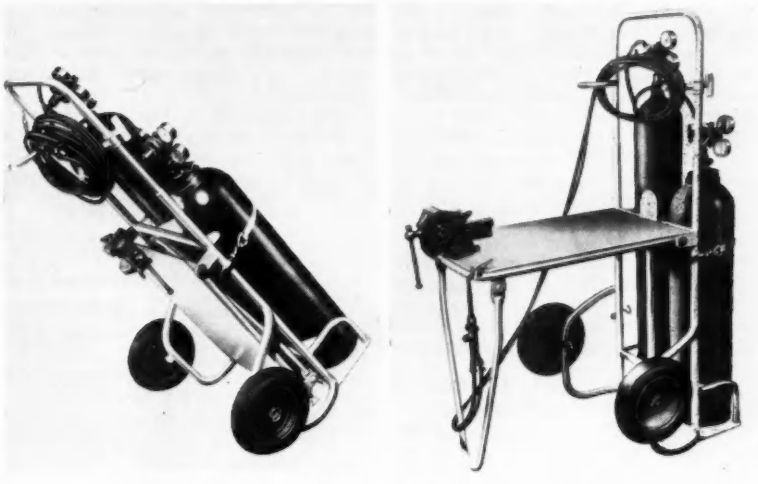
Powers-Samas 'Double 80'

Powers-Samas announce a new series of punched card accounting machines to be known as 'Double 80.' The series includes punching, sorting and tabulating machines, and the usual ancillary equipment. All function on the mechanical principle for which Powers-Samas punched card machines are famous.

The name is intended to indicate the unusually large recording capacity of this equipment. Although the cards are the same dimensions as the well-known 65-column cards they can accommodate 160 columns of information or even more under certain conditions; *e.g.*—it is possible to record 19s. 6½d., in only two columns.

Industrial designers have contributed to the operating facility as well as appearance, much attention having been paid to the location and accessibility of control buttons. In the tabulator, for example—a machine which is pre-set by the operator for the type of work it is about to produce—the controls are all unidirectional; those which move in the horizontal plane being pulled out to become operative and those in the vertical plane being moved down to become operative. Generally, the familiar action of the common electric light switch has been followed.

While the new 'Double 80' series has been designed to provide a complete installation in itself; that is, it comprises the complete range of machines requisite for the production of all the data and accounts required by the accountant and statistician, it is also particularly suited to work in conjunction with electronic computers.—*Powers-Samas Accounting Machines Ltd., Powers-Samas House, Holborn Bars, London, E.C.1.*



Left: *The 'Dual' trolley packed.* Right: *As a workbench.*

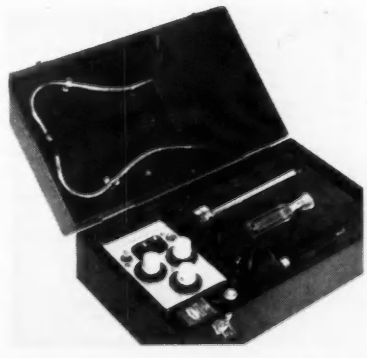
Acoustic instrument

The 'Sonatron' is an entirely new subminiature electronic, highly sensitive acoustic instrument, specially designed to give a 90 decibel gain, enabling one to tune in to sounds and vibrations far beyond the range of the human ear. At the same time it is adaptable to listen to the internal vibration of noisy machinery. Vibrations in the vicinity of minus 60 decibels can be amplified and clearly distinguished, say the makers, the distortion and general interference being negligible.

As an example of the instrument's sensitivity, it is claimed that a $\frac{1}{32}$nd diameter hole in a 10-in. diameter pipe buried approximately 3 ft. 6 in. underground and carrying water, was discovered 250 yards from the point of leak. By further tests at 50-yard intervals the actual seat of the leak was discovered—all acoustically.

The instrument is very simple to operate, there being only three controls. These controls cover a frequency of 25-20,000 cycles per second and it is possible to 'tune in' to the frequency required, and 'tune out' or subdue unwanted frequencies. The 'Sonatron' is completely portable and independent of outside sources of supply. It operates from two miniature batteries—both housed in the robust metal instrument case—the dimensions of which are 4¼ in. by 3¼ in. by 1⅛ in., and weighs only 18 oz.

In addition to its use as a stethoscope, the instrument will drive most types of measuring instruments, graphers, tape recorders, and a specially designed loud speaker, and opens up a new field of high gain pre-amplification.—*Airsonic Ltd., 14, Old Queen Street, Westminster, London, S.W.1.*



The 'Sonatron' in its special metal case.

Dust-free buildings

Details of the plant recently supplied and installed by Smeaton & Sons Ltd., in a factory at Brentford, include a recirculation type ventilating scheme incorporating a filter capable of removing in excess of 97% by weight of airborne solid matter. This is combined with an insulated and dust-proof roof, a dust free floor, dual heating systems and the elimination so far as possible of dust-catching fittings.

Air is drawn in from outside or from the building itself and passed through a rotary type viscous oil filter. It is then heated in a finned heat exchanger and re-

distributed to the building through 'Airmaster' diffusers fitted in the roof. Low level extraction grilles return the air to the filter. Circulation is maintained by a fan of 5,000 cu.ft. per minute capacity, driven by a 3 b.h.p. motor.

Supplementary heating is obtained from low pressure hot water radiator circuits. Both heating systems draw on a common gas-fired boiler and each is independently thermostatically controlled.

The roof is made up in part of double pavement glass lights set in reinforced concrete and in part of wood-wool slabs faced with wood fibre-board lining. Light-weight mineralized felt is used as the outer roof covering.

The floor is of concrete, in which are cast the air-conditioning ducts and electrical wiring channels. Over this has been laid a coating of a dust-free plastic material, which is resistant to expansion stresses and provides a certain amount of resilience under-foot.

Smeaton & Sons Ltd., were established in 1872. The Company's activities now cover a full range of plumbing, heating, ventilating and air conditioning installations for industrial, scentific and domestic buildings.—*Smeaton & Sons Ltd., 40-43, Chancery Lane, London W.C.2.*

Self-priming pump

A new pump unit comprising a self-priming pump mounted on the flange of a split phase motor has been designed by Arthur Lyon & Co. (Engineers) Ltd.

The pump operates on the well-known water ring principle where the volume enclosed by the blades of the impeller increases towards the suction inlet and

decreases towards the discharge opening, which provides a continuous non pulsating flow of liquid.

The body is made of close grained cast iron. The working parts of the pump, namely the impeller and enclosing chamber, are both made of hot brass stampings. These parts are said to be virtually indestructible and as the motor shaft is made of stainless steel no trouble is expected from corrosion or rusting.

The performance of any pump is to a large extent dependent on the efficiency of the sealing arrangements. In this pump a mechanical face type seal is fitted, consisting of a 'Hycar' rubber sealing bellows, a carbon running face and a phosphor bronze counterface. The use of such a seal is a guarantee of high efficiency and continuous service without attention.

The pump can be supplied either for ¼ in. or 1 in. B.S.P. connections and drain plugs are fitted to give protection from freezing in cold weather. Standard motor voltages are 200/220, 230/250, 50 cycles single phase. A 60 cycle unit will be available shortly. The pump is self priming to a suction lift of 25 ft. and will generate a total head of 100 ft. The maximum output from the pump is 500 gal. per hour. Its approximate weight is 45 lb. Overall dimensions are: Length 13¼ in., width 6¾ in., height 6¼ in.—*Arthur Lyon & Co. (Engineers) Ltd., 6, Carlos Place, Grosvenor Square, London.*

Tar emulsions

In recent years the processing of tar emulsions has become increasingly difficult due to the use of heavy oils in enriched water gas and the new oil gas sets. Tar emulsions of remarkable stability are being produced containing as much as 85% water. These emulsions constitute a problem in storage, contamination of waste water and the general utilization of the tar.

As the tar is produced in the gas sets, it is of utmost importance that the gas sets be operated properly. Undercracking of the fuel oil results in free oil in the tar and the presence of uncracked oil results in stabilized tar emulsions that are almost impossible to demulsify. Emulsions containing free oil will not respond to treatment with any type of surface active agent whether the demulsifier be anionic, non-ionic or cationic. Overcracking results in large quantities of free carbon in the tar, producing a tar of coarse consistency and high viscosity.

One property is common to all tar emulsions, they are negatively charged and are capable of being demulsified with cationic surface active agents.

'Fatchemco T.E.B.' is said to be outstanding for its effectiveness in the production of dehydrated tar; its addition to the relief holder will concentrate the emulsion, free the cups and, after a period of time, will cause decomposition of the emulsion and allow the operator to take relatively dry tar from the bottom of the holder; and the application of 'Fatchemco T.E.B.' in the separators facilitates the concentration of the emulsion and decreases the volume of emulsion that has to be handled. For more information on these applications and on the prevention of emulsion formation write to the agents introducing 'Fatchemco' (an American product) into this country.—*C. Tennant Sons and Co., Ltd., 4, Copthall Avenue, London, E.C.2.*

Diesel hydraulic loader

The introduction of the 'Supalift,' a new high-lift version of their model 2-WL diesel hydraulic loader, is announced by E. Boydell & Co., Ltd., manufacturers of the Muir-Hill range of dumpers and loaders.

This new model has been designed to give a maximum discharge height from the ground to the lip of the tipped bucket of 14 ft. 8 in., while retaining the remarkable degree of stability claimed to be afforded by the Muir-Hill patented double three point suspension system. Maximum forward reach with the beams in the horizontal position is 5 ft. 6 in. from the steering tyres.

With these dimensions a maximum safe working load of 15 cwt. and a choice of two specially designed lightweight buckets (one of 1 cu. yd. capacity and full 6 ft. width for coal and coke handling, and the other of ¾ cu. yd. capacity and 4 ft. 6 in. overall width for normal materials loading) it is claimed that the 2-WL 'Supalift' loader has unique potentialities not only for loading weight batch hoppers, concrete plant, overhead bunkers and other elevated discharge points without the necessity for constructing ramps, but also for spreading the load more evenly over a wider area of the hoppers and bins than has previously been possible.

The machine also has a specially designed cab constructed from sheet metal sections connected by pre-stressed rubber bushes, providing a resilient unit, with sliding windows fitted at both sides and a rear opening door.

The overall height of the machine with the bucket down is 8 ft. 3½ in., and the

Muir-Hill 'Supalift' hydraulic loader.

length with the bucket in the same position is 17 ft. 11½ in.—*E. Boydell & Co., Ltd., Old Trafford, Manchester.*

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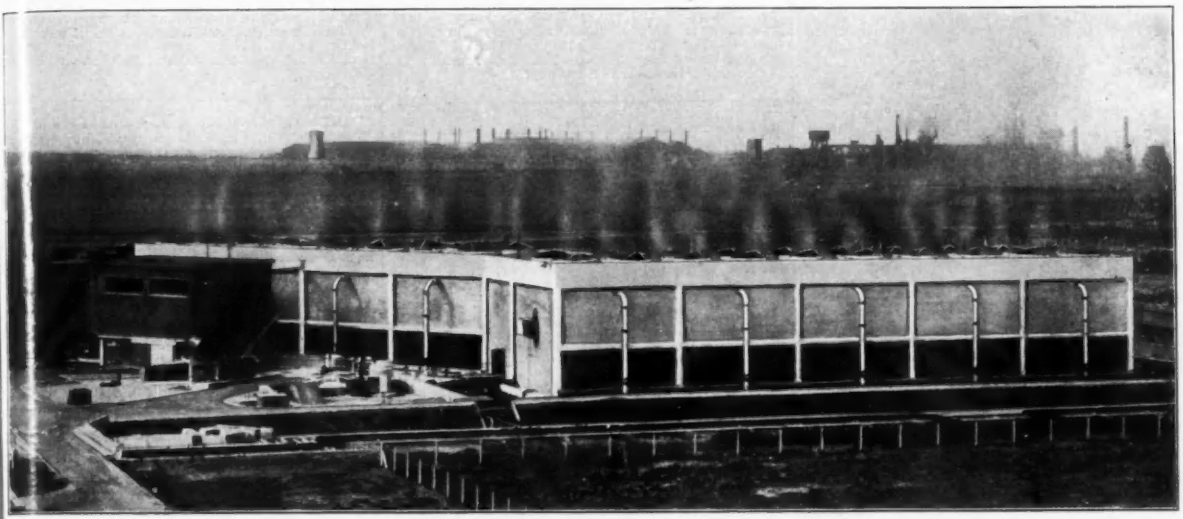

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Classified Advertisements: All small classified advertisements are charged at **2**/– per line (approx. **7** words)—minimum charge **10**/–. A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received **14** days prior to publication if proofs are required. Type area of inside pages **10** in. deep × **7** in. wide; block screen **120**.

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The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order,* 1952.

CHIEF RESEARCH OFFICER required for the recently formed Heating and Ventilating Research Council at their new laboratories in Leatherhead. This Council receives support from the Department of Scientific and Industrial Research. The successful applicant will be required to carry out and supervise research work on various heating and ventilating problems and collate data for use of the industries concerned. The ability to initiate and carry out research is essential, and experience of the heating and ventilating industry is desirable. Applicants should send details of their research and other experience, stating salary required, to:—The Secretary, c/o. Messrs. Andrew W. Barr & Co., 202, Bishopsgate, London, E.C.2.

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APPLICATIONS are invited from suitably qualified Gas Engineers for the position of ASSISTANT SUPERINTENDENT (MAINS).

The salary will be within A.P.T. Grade 9 Provincial 'A' (£755-£855) with placing according to qualifications and experience.

A rented house will be available, if required by the successful candidate.

Applicants should possess the Higher Grade Certificate (Supply) of the Institution of Gas Engineers, or an equivalent qualification. Applicants should be experienced in all branches of gas transmission at low, intermediate and high pressures. Sound training and experience in the planning, estimating and supervision of distribution systems is essential.

The post is superannuable, and the successful candidate may be required to pass a medical examination.

Applications stating age, education, training, qualifications, experience, and whether present post is superannuated, together with the names of two referees, should reach the undersigned by April 28, 1956.

W. S. JOHNSTON,
Group Manager.

Gas Works,
50, East Dock Street,
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April 5, 1956.

PHYSICIST and CHEMIST. Young man required for Works Laboratory in West Country, preferably with the experience of testing gas appliances. Apply: No. 278, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

METERING ENGINEER required for Pakistan. Preference given to applicant who is a corporate member of the Institution of Gas Engineers or Mechanical Engineers and possessing experience in the installation and regulating of meters in the gas industry. The post carries a good salary; free medical attention; married furnished accommodation (as available) will be provided; initial contract will be for three years.

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APPLICATIONS are invited for the position of MANAGER of the Stella Gill Coking Plant, Pelton Fell, Chester-le-Street, Co. Durham. Applicants should preferably have had experience of the supervision of a coal washery and the purification of gas for towns supply.

Salary range—£900—£1,550 p.a.

Applications, quoting Reference No. EV. 63, to be submitted within 7 days of publication to Divisional Establishments Officer, Staff Department, National Coal Board, Durham Division, "D" Floor, Milburn House, Newcastle-upon-Tyne 1.

NORTH THAMES GAS BOARD

SAFETY OFFICER required at the GASWORKS, BRENTFORD, MIDDLESEX.

APPLICANTS, who should not be over 40 years of age, should have a general knowledge of Civil and Mechanical Engineering practices and of industrial accident prevention. Attendance at an industrial Accident Prevention course would be an advantage.

Starting salary will be within the range £700 to £800 per annum according to age, qualifications and experience.

The successful candidate will be required to join the Staff Pension Scheme.

Applications, stating age and experience to Staff Controller, 30, Kensington Church Street, W.8, quoting reference 666/344.

NORTH THAMES GAS BOARD

ASSISTANT ENGINEER (Mechanical) required at the Gasworks, Beckton, E.6, for supervising maintenance of heavy mechanical, steam and power plant. Higher National Certificate is the minimum qualification required.

Starting salary will be from £675 to £875 per annum according to age and experience. The successful candidate will be required to join the Staff Pension Scheme.

Applications, stating age and experience, to Staff Controller, 30, Kensington Church Street, W.8, quoting reference 666/345.

EAST MIDLANDS GAS BOARD

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Applicants should have had extensive practical experience of mains and service work, and be thoroughly competent to plan, design and estimate all types of distribution projects. They should be Corporate Members of the Institution of Gas Engineers, or possess an equivalent qualification.

The post is pensionable, and the successful applicant will be required to pass a medical examination.

Applications giving full details of age, education, qualifications and experience, together with the names and addresses of two referees, should be addressed to reach the undersigned not later than April 27, 1956.

A. GWYNNE DAVIES,
Secretary.

Beverley House,
University Road,
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April 6, 1956.

FITTER required by Manufacturers for servicing Gas Fired Boilers. Willing to travel after initial training period. Home week-ends. Reply: No. 279 *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

COKE OVEN MANAGER.—South Durham Steel & Iron Co., Ltd., invite applications for this post with house available, stating age, also experience, and marked "Confidential," to The General Works Manager, Cargo Fleet Iron Works, Middlesbrough.

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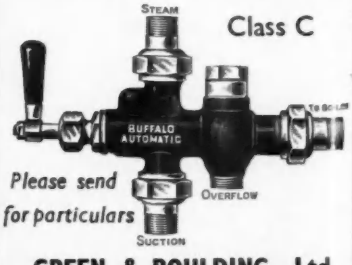

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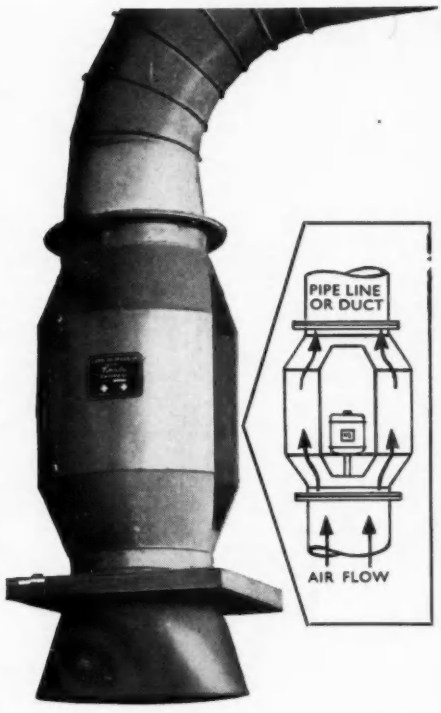

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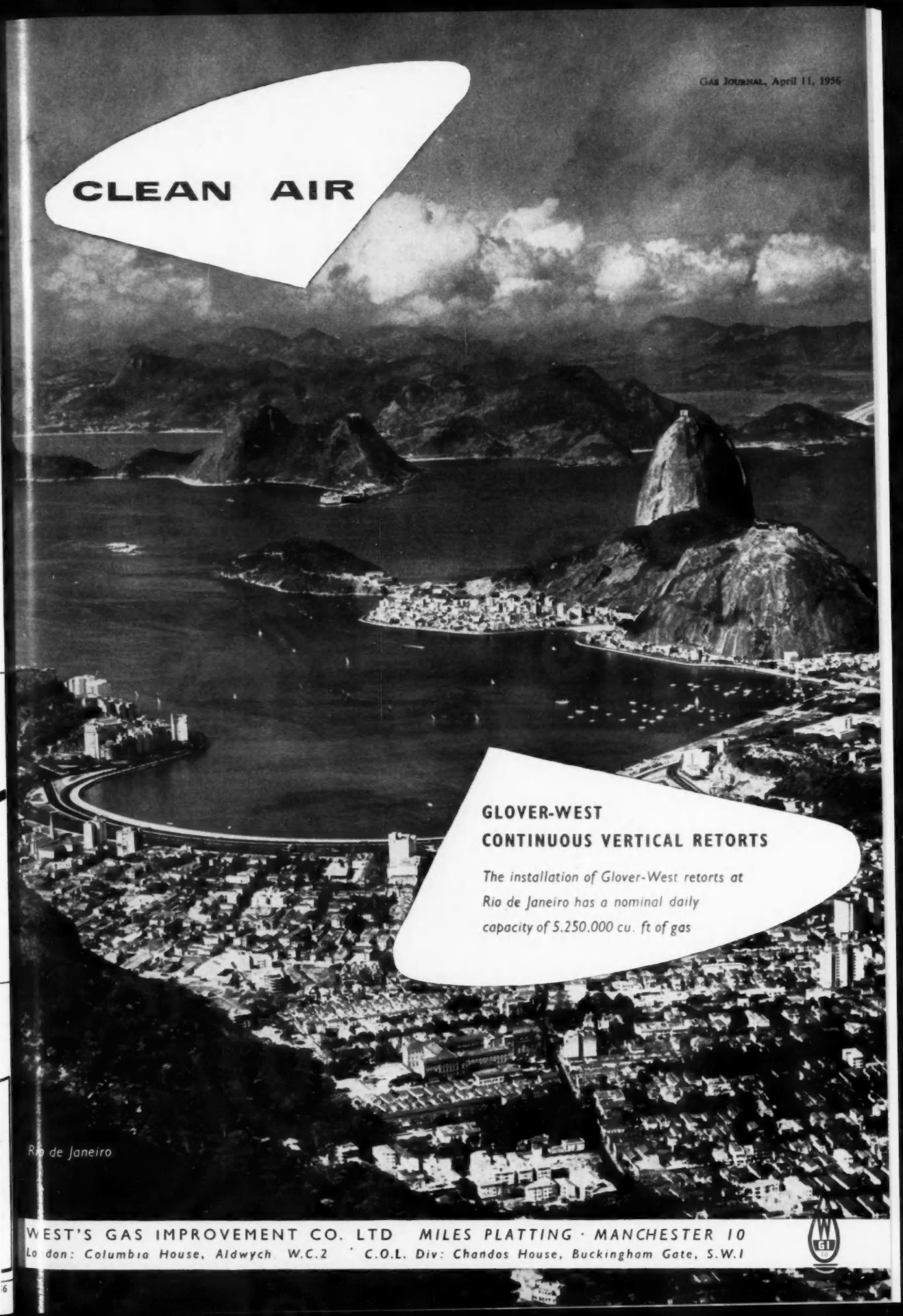
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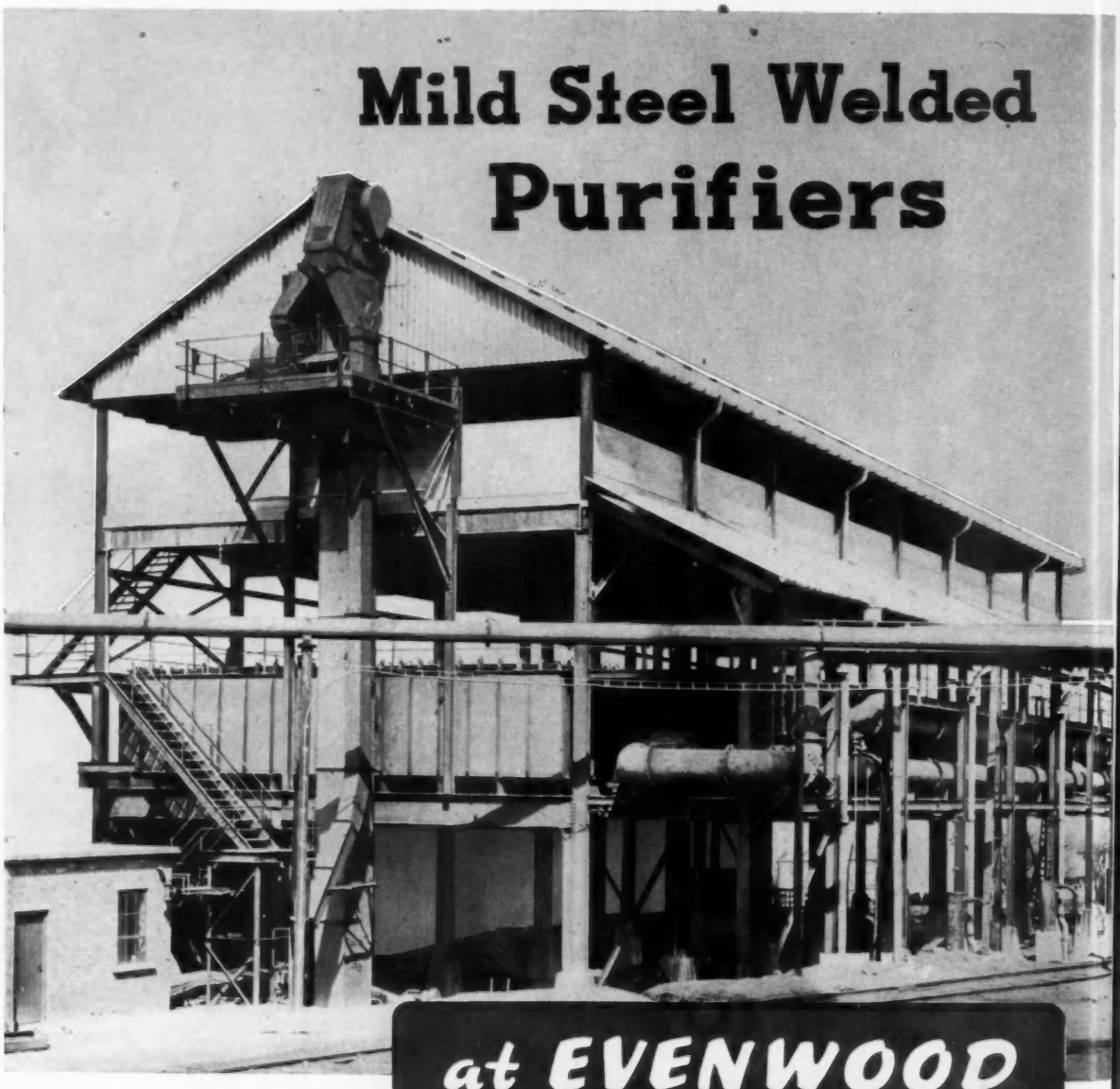

at EVENWOOD

This purifier installation comprises four Mild Steel Welded Boxes which are capable of handling 3-mill. cu. ft. of gas per day and have been prepared for further extension.

The Purifiers are housed in a steel-framed building with overhead concrete revivifying floor and oxide handling equipment. Photograph by courtesy of Northern Gas Board and Sadler & Co. Ltd.

Newton Chambers

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